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HOT SHOT

EVENT

MotoAmerica Superbike Challenge, Miller Motorsports Park, Tooele, Utah

PHOTOGRAPHER

Riles & Nelson

Monster Energy Graves Yamaha teammates Josh Hayes (1) and Cameron Beaubier (2) are dominating the new MotoAmerica Superbike series, with either rider winning as of the seventh round at Mazda Raceway Laguna Seca.







BY KENT KUNITSGU

WHEEL SPIN



THE \$184,000 QUESTION

Does Honda's RC213V-S really have a place among street-legal specialty bikes?

PHOTOGRAPHY COURTESY OF HONDA

>> On June 11, prior to the Catalunya MotoGP race, Honda officially unveiled its MotoGP replica for the street, designated the RC213V-S. The bike is said to use about 80 percent of the same components as the RC213V MotoGP racebike, including the frame and swingarm. The V-4 999cc engine is said to be a close copy of the MotoGP powerplant, minus the pneumatic valve train, seamless-shift transmission, and some changes for reliability. And the RCV-S has all the requisite lights, turn signals, mirrors, and license-plate hanger required for street legality.

Many are fawning over the long-rumored Honda finally making its appearance, and I'll admit I too was initially seduced by the similarity to its MotoGP forebear and its exclusivity. But after looking at the fine print, there were a few niggling issues with the RCV-S that quickly dulled the luster of its carbon-fiber-reinforced plastic bodywork.

First was the most obvious one: the price. Listing for a princely \$184,000 in the US puts the RCV-S up in the stratospheric zone for exclusivity and basically makes the \$72,500 Ducati Desmosedici RR ("The Firebreather," June 2010) look like a relative bargain. But even more glaring than the price was the fact that the US version of the Honda will be restricted to just 101 hp at 8,000 rpm (with a 9,400-rpm rev limit). Not only that, but the optional "Sports Kit" that includes various parts to boost the European/Australian-spec RCV-S from 157 hp to a claimed "over 215 hp," will not be available for sale to US customers.

"So what?" scream the bike's fans. "Anyone with that kind of money will just go to Europe or Australia and buy the race kit, or they'll have someone here reflash the ECU to bring it up to European spec." Others point out that you're basically getting Honda's factory MotoGP racebike in street-legal form, so the \$184K price is a steal in relative terms.

Actually, the RCV-S more closely resembles the RCV1000R (the racebike that Honda sold for MotoGP's lower-echelon Open class in 2014), and this was admitted to by Yosuke Hasegawa, the project leader for the RCV-S, during the Catalunya presentation. HRC officials initially claimed the RCV1000R was very close in performance to the factory RC213V—until several races into the 2014 season it was obvious that the RCV1000R was actually very far off in terms of engine power. The RCV1000R was quietly discontinued in favor of the higher-spec RC213V-RS for 2015 now used by the non-factory Honda teams.

I don't doubt that anyone wealthy enough to plunk down six figures on a motorcycle will find a way to get the RCV-S up to Euro-spec or obtain the Sports Kit. But my question is, why should they have to? Ducati didn't dull down its hand-assembled Desmosedici RR for the American public; in fact, it went through great pains to produce a street-legal version of the MotoGP bike, designing a completely new engine that—while very close in design to the real MotoGP powerplant—only shares the cylinder

head bolts with its racing sibling.

When a former Yamaha MotoGP crew chief saw the 2015 YZF-R1, he remarked that overall engine and chassis architecture very closely resembled the 2012 YZR-M1 MotoGP bike. And after riding the new R1 (and seeing the impressive racing results of the R1 in Superstock—i.e., mildly modified—form), we're pretty confident he was right. Yamaha embarked on the vastly more difficult route of taking that formidable racebike and distilling it down as little as possible while making the performance of both engine/chassis and electronics obtainable for the average sportbike rider in mass-produced form.

By comparison, the RC213V-S is basically an RCV1000R with some production-based bits tacked on for durability and street legality, a very simplified electronics package, and then just an artificially limited rpm in order to meet sound emissions standards because Honda didn't go through the effort of designing and manufacturing a solution to the problem. I could attempt to justify the stratospheric price if Honda had simply made the RCV-S a track-only machine with the race kit included.

Don't get me wrong. Those lucky few who are able to get an RC213V-S will certainly have a piece of racing history, and hopefully they'll get the race kit to really enjoy its performance. But the bike itself simply smells too much like a brand-image stunt than any real attempt to offer MotoGP technology to the public. **SR**



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STOPWATCH



BY ANDREW TREVITT



Project 156, based on a prototype engine provided by Victory, built by Roland Sands Design, and ridden by *Cycle World's* Don Canet, competed in this year's Pikes Peak International Hill Climb.

VICTORY!

Another American company enters the sportbike market

PHOTO COURTESY OF VICTORY

>> *Sport Rider* readers are likely unfamiliar with the Victory brand of motorcycles, but that might all change in the next couple of years as the American company ventures into the sportbike market. In business for approximately 20 years, Victory began with its V92C cruiser in 1998 and has steadily grown since then; currently the company offers a line of cruisers, baggers, and touring models, competing with Harley-Davidson and the Japanese cruiser brands. Over the last while, Victory has branched out from its cruiser origins and into the sportier end of the market.

Two years ago, Victory entered the NHRA Mello Yello Drag Racing Series, with riders Matt and Angie Smith riding bikes bearing the Victory Gunner name in the Pro Stock class, though, in typical NHRA fashion, little if anything on the bike is from the Victory parts catalog. Earlier this year, Victory's parent company Polaris acquired the electric motorcycle arm of Brammo, which manufactured the Empulse and other electric motorcycles. Brammo has had some success in various electric-bike racing series, including TTX and FIM championships. Two Victory electric motorcycles, essentially rebadged Brammo racebikes, were entered in this year's Isle of Man TT Zero race; Lee Johnston finished on the podium in third with Guy Martin in fourth.

Even more recently, *SR* was invited to a press launch for a new Victory model that turned out to be an electric bike very similar to the Brammo Empulse. Of the few electric motorcycles we've seen offered to date, the Empulse

(and now the new Victory model) always struck me as the one model that offered a decent balance between power, weight, and range suitable for sportbike use without a stratospheric cost.

What has piqued my interest over the last little while has been Victory's Project 156, a Pikes Peak International Hill Climb entry. The bike, ridden by *Cycle World's* Don Canet, features a chassis hand-built by Roland Sands Design and prototype engine provided by Victory. Various videos and photos of the bike show that the engine is based on the Indian Scout engine. Indian is another brand under the Polaris umbrella, also offering a line of cruiser motorcycles, and the Scout is powered by an 1,133cc liquid-cooled V-twin with moderately oversquare cylinder dimensions. The Project 156 bike looks to have the Scout's basic bottom end but has prototype cylinders and cylinder heads very different from the Scout's engine and much more compact. It's unlikely that Polaris/Victory would go to the trouble of making those prototype parts for a single racebike, and my guess is that the company has bigger plans in store for the Scout-based motor.

Unfortunately, after a promising start Project 156 didn't meet with success at Pikes Peak. Canet qualified in fourth overall and first in the Exhibition class and was on pace for an overall podium finish but crashed midway up his run on race day. He remounted and continued, only to have the bike stop running near the end of the course with an electrical issue likely caused by the crash. Still, the bike's speed in

qualifying bodes well for a potential sportbike based on the prototype motor, if that is indeed what's coming in the future.

While Victory itself might not be a huge company, its parent company Polaris definitely is and has the resources to dabble in new markets as it has been doing. Based in Minnesota, Polaris is well known for its snowmobiles and ATVs and also builds the Slingshot line of on-road three-wheelers. The company had almost \$4.5 billion in sales in 2014, with Victory, Indian, and the Slingshot models accounting for approximately 8 percent of that.

The last great hope for an American sportbike, Erik Buell Racing, is currently in receivership with the company assets auctioned off (either in parts or in its entirety) by the time you read this. Reports suggest that Hero, one of the largest motorcycle manufacturers in the world and a major partner in EBR, defaulted on moneys owed to EBR, forcing the company to shutter its doors. All this, of course, after Buell was closed by parent company Harley-Davidson in 2009.

If the inception and first few years of Victory are any indication, Polaris will likely take a very studied, structured approach to expanding the line into sportbike territory, and we might not see anything more than Project 156 and the electric bike for a while yet. That is not a bad thing, as the long-term plan seems to be working very well for the company and its cruiser line. Still, I am sure a lot of people will be keeping an eye on the company's progress just as I will. **SR**

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MAILBOX | READERS FIRE BACK

LETTER OF THE MONTH

WHY IS HOT-WEATHER GEAR COLORED BLACK?

I've been a rider of sportbikes since 1987, back when my first bike was a Kawasaki Ninja 750R. I've also had a continuous subscription to *Sport Rider* magazine since the very first issue. Great mag, and the decision to split off from *Motorcyclist* was a brilliant move.

Over the decades, I've been continually impressed with the progression of technology and the increasing capabilities of each successive sportbike generation. Riding gear has also seen fantastic improvements as well—with one exception.

Although color choices have vastly improved over the years (and I consider high-viz gear to be one of the best improvements), the color black is still the most ubiquitous. Since the middle of the 20th century, black has been associated with motorcycling. That's fine; it goes with everything, right?

When it comes to riding in the American desert southwest as I do, however, it is a miserable choice. Looking for mesh riding gear this year, I am confused to find that big swatches of black material are part of nearly every offering. Hello? Mesh gear is for hot weather. Black is a sun-soaking sponge that will turn every summer afternoon commute into a two-wheeled tour of Dante's inferno. I am trying to stay comfortable on the ride, not rehearse for my eventual cremation.

What gives with manufacturers making mesh gear black?

Todd Harrison
Rio Rancho, NM

The problem is that 10 or so years ago, black (along with other non-conspicuous dark colors) became the preferred color choice among the majority of motorcyclists shopping for any riding gear, whether it was mesh, textile, or leather. The same thing occurred with helmets; remember when helmet makers were suddenly rushing to come out with flat-black models in their lineups? Thankfully that fad has run its course, and now more riders are looking to add at least a little color and not look like the asphalt they're riding on. We're seeing a better variety of color combinations in much of the hot-weather gear manufacturer catalogs now.

To help him not feel like he's in Dante's inferno, Mr. Harrison has got himself a new Vemar Eclipse helmet in the latest Racer USA graphic, courtesy of the great people at Motonation. With an aerodynamically shaped outer shell consisting of a carbon/aramid/fiberglass blend, the Eclipse features a dual-density inner EPS liner, the company's Klima ventilation system with four frontal intake vents and two rear exhaust vents, and cheek pads employing a proprietary memory foam that is claimed to hold its shape longer than conventional pads. The inner liner and cheek pads use a fabric that has a life-long treatment against odor, fungus, and bacteria, and in addition to the standard, non-scratch, 2.2mm-thick clear shield, an extra antifog Pinlock-equipped shield is also included with each Eclipse helmet. The Eclipse comes with a five-year warranty from the manufacturing date (equating to the helmet's usable life), and the helmet meets the motorcycle-specific ECE 22.05 and US DOT standards. Available in sizes S-XXL, the Eclipse retails for \$349 for solid colors and \$399 for graphics like the Racer USA. Contact Motonation at (619) 401-4100 or log on to motonation.com for more info. —Ed.



PROMOTING ABS REVISITED

To the reader who mentioned you're not recommending ABS early or often enough: I see this a lot, especially after someone crashed a motorcycle that lacked the latest electronics. I'm sorry he crashed. I've been there myself, and it's no fun. For me, once ABS is needed, something has gone terribly wrong, and I've reacted too slowly to something in my path. If we keep looking for electronics to save us, we never need to become safer, smarter, or more skilled. Please don't do this. In 20 years, will we blame a lack of crash-avoidance electronics when riding our vintage 2015 Yamaha R1s?

Roland J. Cannon
Salt Lake City, UT

While ABS is certainly not the failsafe that some think it is—and although we promote sharpening rider skills more than most—to be honest, we'd rather be riding a bike equipped with it when we're riding on that cold and wet morning with cold tires when a completely unexpected hazard intrudes into our path. It doesn't matter how good of a rider you think you are; there are situations that you will not be able to foresee nor take precautions to prevent, and you will not be able to outperform the latest ABS systems on wet pavement, guaranteed. We'd rather have that ace in our pocket that could possibly mean the difference between an accelerated heart rate or ending up on the ground (or worse). And as far as street riding goes, most of the latest ABS systems are so transparent that you never know they are intervening. We do, of course, prefer the



switchable systems offered by some manufacturers, compared to systems that you cannot turn off.

As far as a fear of future electronic rider aids nannying the motorcycle to death as we know it, the good thing (or bad, depending on who you ask) is that a motorcycle's single-track tire stance and rear-wheel drive make the engineering of the same type of "crash avoidance" systems that have now become prevalent on automobiles significantly more difficult. For example, if you lose front-tire traction in an automobile with a stability control system, it simply adds braking to the other tires to keep the vehicle from skidding off the corner. Lose front-tire grip on a motorcycle, and the situation is obviously far more complicated. —Ed



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MAILBOX

TRACK-TIRE COMPARISON PLEASE

I have been a subscriber of *Sport Rider* for years and am a trackday enthusiast. My current motorcycle, a 2009 Suzuki GSX-R600, is not street legal. I only ride on the track now. I'm an intermediate rider, and control riders tell me I run mid-pack intermediate pace.

A frequent discussion topic at trackdays is tires. Every rider has his/her brand preferences, and different trackday organizations have different tire suppliers who naturally push the brand they sell. Objective information is hard to come by, and a purchase of a new set of tires is an expensive gamble. Therefore, what would be really helpful to riders like me is a track-tire comparison, done by *Sport Rider*. *SR* seems like the perfect magazine to do such a test, especially given the dearth of reviews of track tires online. One website recently did a tire test but focused on top-of-the-line street tires that can also handle track duties. They didn't focus on track-oriented tires, and that's where I think there's a hole that *SR* could fill.

I now ride mid-pack intermediate pace on Dunlop Q3s, and they serve me well. I'm really curious about the Pirelli Diablo Corsa, which seem common down here, but I'm reluctant to take the plunge because other riders tell me that Pirellis have a very different feel to Dunlops. I'm also curious about the Dunlop GP-A and D211, but some riders told me it's hard to keep heat in them at less-than-advanced group pace.

Please consider my request for a comparison of track-oriented tires. And keep up the good work at the magazine.

Vic Annand
Atlanta, GA



We've got plans for comparisons dealing with both DOT race tires and trackday tires (a category that has grown significantly) in the near future, so stay tuned. Like anything we do, it needs to be done correctly, which is a major undertaking with proper planning, etc. —Ed.



SHOWDOWN!

So *Sport Rider* gets the chance to ride Kawasaki's new track-only H2R, and you guys just run it in a straight line? Why didn't you take it to a real racetrack? That would've been a better contest between which is better, the bike or the car.

Mike Santold
Houston, TX

As stated in the story, the opportunity to even ride Kawasaki's Ninja H2R has been like getting an audience with the pope, considering the tight reins Kawasaki USA was keeping on the bike. We got just one day with the bike, and to ride it against some very fast cars in a measured contest, so we took it. —Ed.

I would like to see how the GTR would stack up if the H2R had similar mods. A friend of mine with

a GTR said the SPE big-horsepower packages like the one you raced cost upward of \$250,000. I don't think you could even spend that much on mods to an H2R.

Harry E. Davis
Cincinnati, OH

Disappointed that you didn't include a Lamborghini Aventador or Porsche 918. Always enjoy seeing bikes beating up on high-dollar cars with their douchebag owners.

Jim Warner
West Palm Beach, FL

The way the whole story came together in two short weeks, we were lucky to be able to run against the exotic cars as it was. And you probably would've been disappointed in the owners, who were all very friendly and definite motorheads. —Ed.



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Arai continues on with its performance-over-style philosophy

BY BRADLEY ADAMS PHOTOGRAPHY COURTESY OF BRIAN J. NELSON

>> Arai pulled the wraps off its new, top-of-the-line Corsair-X helmet this past July and then let us run laps around Northern California's Thunderhill Raceway Park in the helmet to better familiarize ourselves with the replacement to what's been one of our go-to track lids over the years: the Corsair-V.

Updates for the Corsair-X start at the shell, which is constructed using resins that are both stronger and lighter than before. The helmet's round, smooth shell shape remains, but Arai has relocated the side pods away from the Snell line (where the helmet is tested per Snell standards) and ultimately lengthened the smooth, round area from the top of the pods to the top of the helmet by 24mm. Arai is a proponent for making helmets glance off the ground in the event of a fall, and the Corsair-X's smooth, round, and strong shell is said to help facilitate these glancing impacts.

Lowering the side pods causes a problem with shield/shell clearance, an issue that Arai resolved with the introduction of its new Variable Access System (VAS) shield, which pops the side pods off during shield swaps so that you can see what you're working with. Will it make more friends than the last system? Probably not. Of course that wasn't the intention, says Brian Weston, the managing director at Arai Helmets: "Arai designs the shield system around the shell, not the other way around. This shield is developed so that we

could make the helmet shell a better one."

The chin bar on the X was adjusted so that the area relative to your lips is 3mm larger, this so you're not kissing the helmet's insides while riding. Arai has also made the helmet's interior shape a bit longer, a benefit for long-oval-shaped heads. The rest of the changes pertain to the vents, almost all of which have been tweaked. Top diffusers are 20mm longer and straighter for improved aerodynamics on the street, Arai claims, plus have a bump at their leading edge for increased air speed into the vents (think air speed for air traveling over the top of a plane's wing). Meanwhile, a new center duct is said to provide 11-percent better airflow, while enclosed side air channels are claimed to reduce wind noise and pull more air and moisture out from behind the visor. Three-position slide gates on the front vents enable the helmet to be quieter, plus block water in the event of rainfall. Arai has also incorporated a new F1-style latch mechanism for the shield, which is not a lock but is said to "capture" the shield so that it's less likely to open in an impact.

Arai believes that a helmet should not only be protective, but also comfortable, as this allows the rider to not be distracted and instead focus on brake markers, apexes, etc. That's exactly where the Corsair-X excels—in not distracting you with pressure points or other disturbances. Fit is shockingly good right out of the box, with the



The side pods are lower on the Corsair-X, which increases the smooth, round area at the top of the helmet, near where the Snell line is. A smooth, round area, combined with a strong shell, helps with glancing impacts, Arai says. Notice the new vent switch.



Arai's new VAS system enables the shell to still be round and smooth, even in the area where the pods are. The side pods pop off and hang via a string when the plastic lever is pushed back, allowing you to see what you're working with during shield swaps. Notice the new, F1-style shield latch.

helmet requiring absolutely zero break-in time. Furthermore, the lid feels light on your shoulders and provides better airflow than before, mostly through the updated top vents. To boot, the vent doors are easier to manipulate than the doors on the V thanks to the updated slide switches.

We rode with the Corsair-X on the street (on a naked FZ-09) and noticed that the helmet still has some drag, regardless of the rear wing's angle. The X may not be the quietest helmet on the market, but it is definitely quieter than the admittedly noisy Corsair-V. However, it is marginally more difficult to get out of than the V, and shield swaps do require a few more steps. Do swaps often and you'll have it down; don't and you'll rather be playing with a Rubik's Cube. If it helps, try thinking about the protective qualities of the design and the helmet as a whole...

All told, the Corsair-X is better than the V, with better venting, increased room for your chin, and potentially more protection in the event of a fall. The helmet will be available in October 2015 and will retail for \$839.95 to \$849.95 for solid colors and \$969.95 for graphic options. **SR**

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A FLASH OF BRILLIANCE

GAINING 7 HP AND A LOT MORE FROM OUR 2015 R1 TESTBIKE

BY BRADLEY ADAMS PHOTOGRAPHY BY DREW RUIZ

Five minutes. Five minutes is about all it took to get the first 2015 Yamaha YZF-R1 testbike to show up at Sport Rider headquarters into the shop, apart, and up on the dyno. This is the most highly anticipated motorcycle of 2015, and naturally we were eager to see what kind of numbers it would churn out. Then those numbers came in and we were, well, let's just say slightly less excited. Yamaha admits it wasn't aiming for a big power number from the new R1, but that was little consolation when the screen popped up with numbers ranging from 164 to 170 hp. Next up was the BMW S 1000 RR, with 180 hp.

Things only got worse for the R1 when we took off for our first street ride and caught on to the bike's overly abrupt fueling in power mode 1, which soon relegated us to power mode 2, where we'd remain for the majority of our time on the bike. If you've read the previous issue of *Sport Rider*, then you know that the R1 would go on to win our 2015 literbike comparison test by way of a more confidence-inspiring chassis and superior electronic rider aid package. But that doesn't mean the bike was without fault.

And so we turned to the guys at FT ECU, who claimed to have a cure in the form of a re-flashed ECU for the bike, starting at just \$200—not to mention a quickshifter with auto-blip downshift function that would put the R1 on par with the BMW S 1000 RR and Ducati 1299 Panigale S in terms of shifting aids.

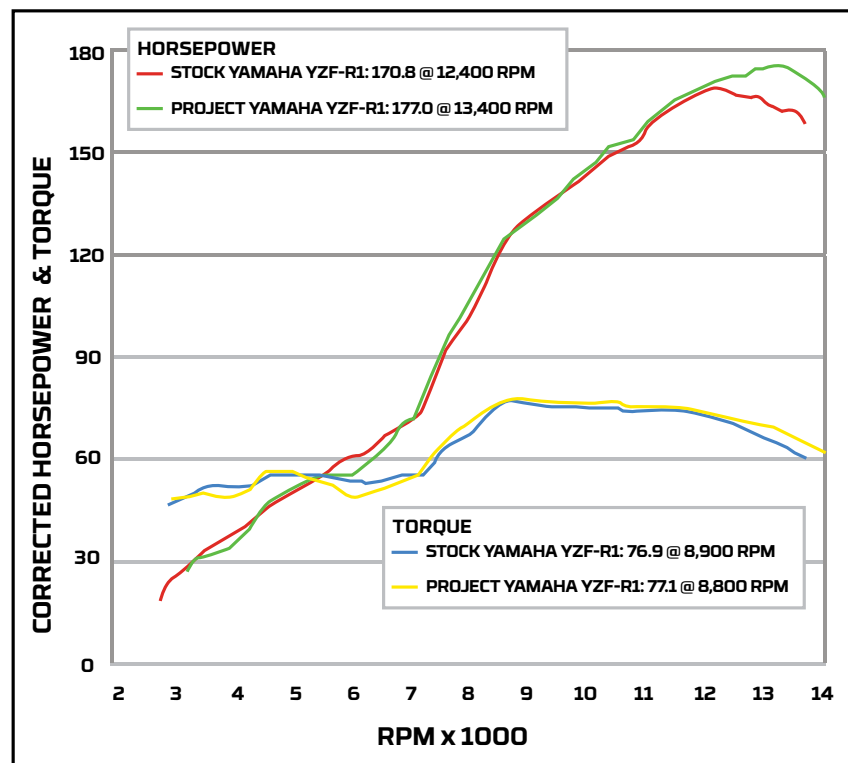
What would an otherwise-bone-stock R1 do with the addition of only a flash for the ECU and updated shifter? We couldn't wait to find out.

Been There, Done That?

We've worked with the guys at FT ECU once before, that time when we were looking to extract a little more performance out of a YZF-R6 testbike and to also familiarize ourselves with re-flashed ECUs, a relatively new method for tuning sportbikes. FT ECU's update for the R6 ECU included a new throttle-by-wire map, updated engine-braking maps, and revised settings for other street-tailored strategies, changes that you'd expect to see duplicated and detailed in the following pages, right?

Right and wrong, says Chris Gardell, the man responsible for FT ECU's bigger, better electronic strategies. "With the R6 we're trying to do away with some of the factory restrictions and to actually give the rider full throttle, whereas with a literbike the goal is make it easier for the rider to put the power down. On a bike like the R1 it's more a matter of rideability, so we have to look differently at the ECU and at the changes we want to make. Essentially, with ECU updates, what we're doing is looking at each bike's weaknesses and tuning that out."

Most of the "looking at the bike's weaknesses" is done at the track, with



Extending the R1's rev limiter by 250 rpm provides a noticeable bump in horsepower up top. Note that while the curves might look the same, the manner in which the power is put down is entirely different.

Gardell going to each of the 2015 MotoAmerica races and working with race teams to fine-tune the settings for the re-flash for Yamaha's R1. "Almost every team racing an R1 in the Superstock 1000 class is on our stuff, so we're able to develop the ECU that way and hear from the racers what's working and what still needs work," he says. FT ECU develops a system on Sunday and makes the updates available to you on Monday. Okay, Tuesday—there's that whole flying home thing.

Interestingly, the feedback from the Superstock 1000 racers has mirrored

Chris Gardell of FT ECU updates then installs the new R1 tune using the company's workbench kit (\$450). For \$200, you can send an ECU in, have it flashed, and sent back to you.



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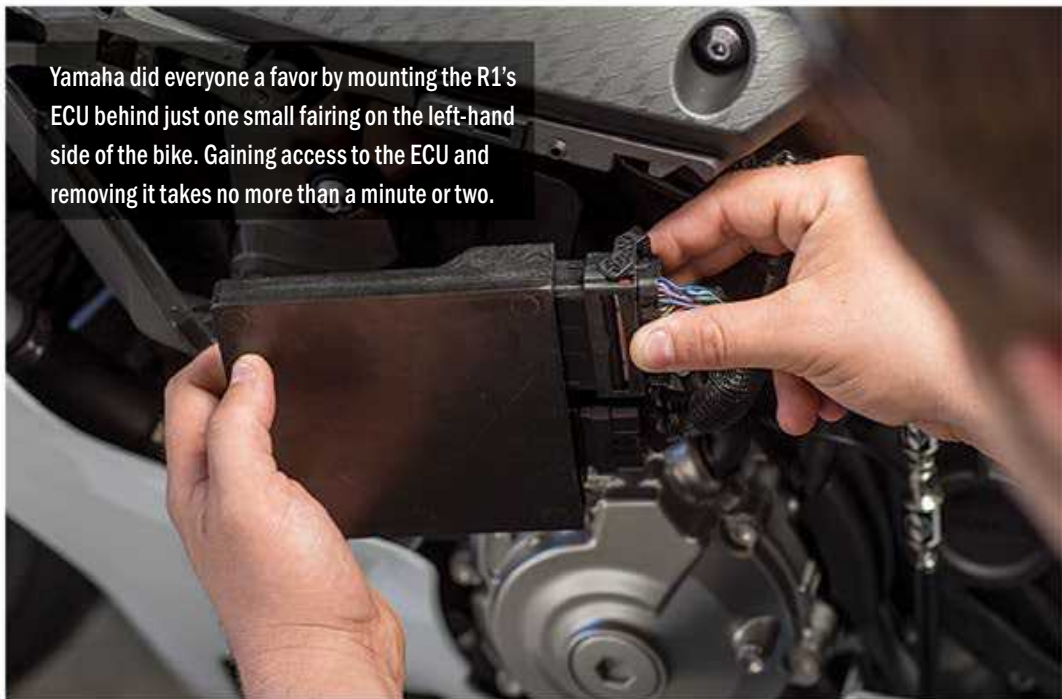


FT ECU's push and pull sensors replace the stock Yamaha shift sensor to provide clutchless (and absolutely faultless) upshifts and downshifts. Installing the unit is as simple as connecting the sensors and running a single wire back to the ECU plug.

the feedback from almost everyone else with seat time on the 2015 R1. "The biggest thing was with the throttle abruptness. Initially, a lot of the top guys were saying that the off/on throttle transition was just too abrupt, so that's the thing we started working on first," Gardell admits. Multiple test days and hundreds of hours at the computer later, Gardell has emerged with an ECU for the general public that's headlined by updated fuel maps, revised ignition maps, new settings for the throttle-by-wire system, an elevated rev limiter, new fan temps, removed top-speed limiter, and more.

FT ECU has various packages for its re-flash, and the one that's right for you depends entirely on two things: what you're willing to pay and how much you enjoy tinkering. You can, for \$200, send your ECU in to the FT ECU headquarters or an FT ECU-supported dealer and have it flashed then sent back. No laptop, cables, or garage time required (well, very little at least, as you'll still need to remove and reinstall the ECU yourself). The second option, a bike harness, costs \$380 and requires you to replace a plug on the ECU, plus tap a few wires into the ECU, while a \$450 workbench kit enables you to take the ECU out of the bike and re-flash it on, you guessed it, your workbench. The latter two kits enable you to connect your ECU to your computer and continually update the tune (the bike kit while the ECU is still on the bike), whereas sending the ECU in means you do not have the harness for continued updates at home or the track.

What kind of tinkering can you do with your computer? Enough to completely transform your bike's personality, really. An Unrestricted Tune (standard re-flash) built by Gardell can be ran as is, or adjusted by you, with optional fuel mapping per cylinder, ignition mapping per cylinder, throttle-by-wire adjustment by gear and mode, rev-limiter adjustment, the option to disable closed-loop fueling,



Yamaha did everyone a favor by mounting the R1's ECU behind just one small fairing on the left-hand side of the bike. Gaining access to the ECU and removing it takes no more than a minute or two.



Our FT ECU re-flashed R1 is an entirely different animal at the track, with smoother off/on throttle but also more power up top. For the money, we can't think of any other performance upgrades that would offer like benefits.

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the option to enable or disable the injector decel cut (important for on/off throttle transition), and more. Moreover, FT ECU offers up multiple Graves Motorsports Tunes, one with ECU settings designed for use with a Graves full-system exhaust, one for a three-quarter exhaust, and one for a slip-on. These tunes have limited mapping access (you can't actually see the map), but you can still change the fan temp, disable the steering damper, change the rpm setting at which the throttle bodies' variable stacks move, and enable dyno mode (wheel-speed sensors on the R1 cause fault codes on the dyno).

We ultimately went with the \$450 workbench kit since the R1 ECU—tucked behind a panel on the left-hand side of the bike—is so easy to remove that it's no problem to pull it out every time you want to re-flash the unit. This kit also keeps you from having to mess with wires, pins, heat shrink, etc., as the bike kit does. Admittedly, we'd still recommend the \$200 mail-in option, as Gardell's standard flash is entirely up to snuff. The only reason we see you wanting to purchase a harness (as part of the on-bike or workbench kit) is, again, if you like to tinker or plan on changing exhausts, build an engine, or make other updates that you'd want to further update the ECU for.

In addition to the ECU re-flash, we also updated our R1 with FT ECU's quickshifter unit, which works with the ECU to enable clutchless upshifts *and* downshifts. The kit, which retails for \$800, installed in 20 minutes or less, requiring us to do little more than remove the stock shift sensor and replace it with the FT ECU sensors (a push and pull), plug the new sensors into the stock harness, and then replace a single pin on the ECU. Removing and reinstalling the ECU, plus installing the shifter, takes no more than 35 minutes, with an initial re-flash taking six minutes (one minute for successive re-flashes).

So what do you get for your time (40-ish minutes) and money (\$1,000 with mail-in re-flash or \$1,250 with workbench harness)? We rolled our R1 up on the dyno and immediately went from 170 hp at the rear wheel to 177 hp, a significant jump for the money and time that comes mostly courtesy of the extended rev limiter.

But more than that, we got a bike that was livelier at the track yet still easier to ride and, perhaps best of all, more fun to run laps on. With the re-flashed ECU, the biggest thing is that you can now actually ride the R1 in power mode 1 and not upset the chassis when you go to crack the throttle open; we tested a stock R1 alongside the re-flashed one and were immediately forced to toggle over to power mode 2 on the less-equipped bike. You also notice the power difference up top, with the standard R1 starting to sign off as you get closer to the rev limiter and the re-flashed R1 making good use of the additional 250 rpm made available by the flash. Somehow, 7 hp for \$200 to \$450 feels better than 7 hp for thousands of dollars.



Graves Motorsports Full-System Exhaust Test

While the idea behind re-flashing the ECU on our 2015 R1 was to see how we could alter the bike's performance using stock hardware, we were still curious to discover what the bike would be capable of when combining that electronic update with a more familiar modification: a full-system exhaust. Sans motor work, what is the new R1 *really* capable of?

Graves Motorsports, who works closely with FT ECU to provide flashes specifically developed for its exhausts, wanted to help us figure that out and stepped up with one of its full-system exhausts. Manufactured from nothing less than carbon fiber and titanium, this exhaust is identical to the one on Josh Hayes' and Cameron Beaubier's superbike. "Guys want to have the same product that they see on the superbikes, so if we make updates to the system on the racebikes, we do it to our customer product as well. And that's what we've done with this latest exhaust," Chuck Graves says.

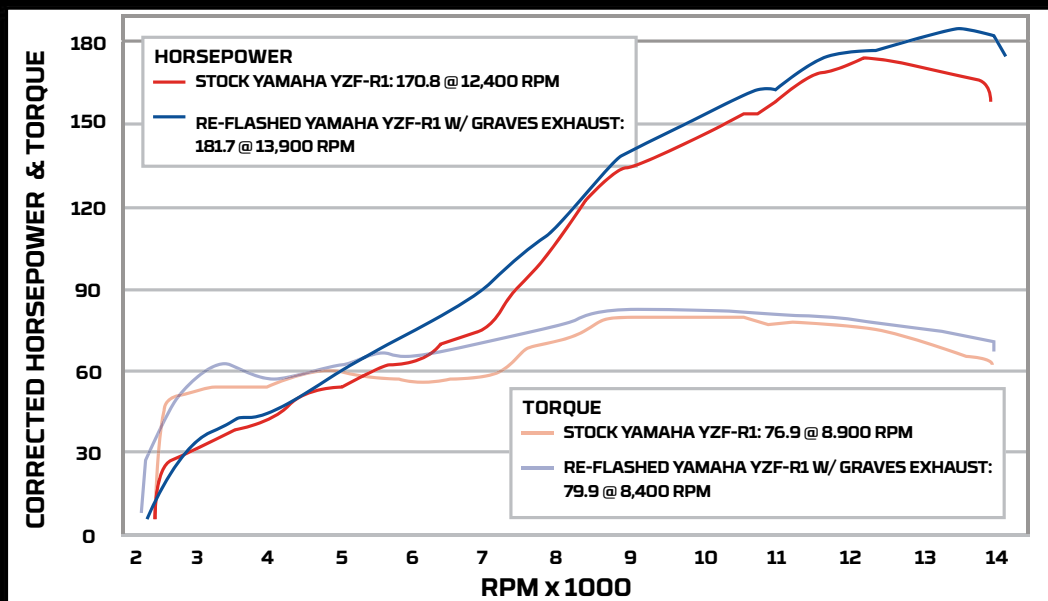
The benefits of Graves developing its system for racing—and the crew's quite obvious penchant for perfection—shows in the final product, with the exhaust installing without hiccup and all the components fitting together like they were made as one. Fit and finish is what you expect from a manufacturer/team that knows millimeters and ounces win races, and not something you find on exhausts with less riding on their tail pipe.

As for the tangible performance advantages, we lost a total of 16 pounds (!) and

gained an additional 4 hp (over re-flashed bike with stock exhaust), bringing weight to 423 pounds and the total output of our R1 to 181 hp and 79 foot-pounds of torque. More than that, however, the system gave us much more impressive power curves, with a noticeable bump in power between 5,000 and 8,000 rpm. On top of that, the R1 sounds like something out of a wet dream, with a throaty exhaust note that's—albeit loud—enough to have you thinking this is Josh Hayes' superbike.

Graves' full-system exhaust retails for \$2,650, meaning there are less expensive options (including Graves' own \$1,365.50 Cat Eliminator exhaust and \$599 Moto1 Cat Back slip-on exhaust). We think that a 16-pound weight savings, modest bump in power, and much-improved power curve are worth keeping in mind though. Note also that because Graves had just updated the taper, tubing, etc., that it'll also be updating the ECU tune, which will then be made available through the FT ECU File Manager. By the time you read this, a more perfect map will be available that could potentially offer even more horsepower gains (we were the first to get our hands on the newest version, meaning there was little time for Graves to update its map).

As for our R1, we've now taken it from a 170-hp bike that was exciting to ride to a 181-hp monster that sounds ferocious yet is somehow easier and more enjoyable to ride. If you want the most out of your 2015 R1, then this is definitely a road worth looking down.



But Wait, There's More

If the shifter on the 2015 BMW S 1000 RR and Ducati 1299 Panigale scored a seven and eight respectively on a 1–10 scale, then the FT ECU shifter comes in at an 11. At the track, you can make downshifts as fast as you'd like, plus there's a positive feel between gears that guarantees you've made the shift, a reassuring feeling you're oft missing on the BMW. Shifts are smoother than on the Ducati, and blips of the throttle don't upset the chassis at corner entry. What this does is free up some space in your brain and allow you to focus more on your braking markers and your turn-in reference points. With the R1, instead of thinking, "Clutch, throttle blip, foot," we were now thinking, "Okay, shifts are done, now focus on braking a little harder." Ultimately, the ability to concentrate on better braking habits will lead to quicker laps. "Yeah, that's what we think a good auto-blip shifter should do, is help you cut lap times. And we think that's what ours does," Gardell reiterates.

He goes on to mention that these updates are mostly possible thanks in part to Yamaha's push for better components from the factory. "With the 2015 R1, Yamaha went to a single processor, instead of two as there was before, which caused a communication delay. The 2015 model uses a single, higher-capacity chip to run

both fuel injection and electronic throttle valve, making auto-blip signaling much more straightforward. And then with the transmission, they're using a potentiometer-style gear position sensor, so that allows us to base the timing of our events not only on pedal pressure but more importantly on the internal movement of the transmission. Before, there was a series of contacts—one for each gear—with different resistance values in it, so it would feed back through an analog channel and say 'this resistance value means that I'm in this gear.' The problem is you can't know if you're *between* gears. With this one I can know anywhere within the rotation of the shift drum exactly where you are relative to gear position, and I can tell it 'only activate when you are between second and third gear but not already into third gear.' I have the ability of setting a window of where it can activate and where it can't."

Of course having the hardware to work with is just half the battle and the rest entirely up to Gardell and the crew at FT ECU, who have spent countless hours staring at low-level instructions (assembly code) and fine-tuning the strategies for everyone from trackday enthusiasts to racers (note, FT ECU sells a race kit with re-flash that has updated parameters for traction control, wheelie control, launch control, and slide control). The fact



that they have been able to come to market with a product like this R1 ECU for as little as \$200, and a shifter that is far superior to the units on the BMW or Ducati—for \$800—is truly remarkable. Together, it all adds up to a much-improved R1.

Give us five minutes and I guarantee we'll have another trackday or two booked. That's how eager we are to use it again. **SR**

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BUDGET BLASTERS



YAMAHA'S BEST-SELLING FZ-09 MEETS SUZUKI'S "NEW" GSX-S750. WHICH IS THE NEW BUDGET PERFORMANCE KING FOR AROUND \$8,000?

BY KENT KUNITSUGU PHOTOGRAPHY BY KEVIN WING

It's pretty obvious that Yamaha has had a sales hit on its hands with the FZ-09 since the bike's 2014 debut. The all-new crossplane-crank three-cylinder-powered naked bike offers excellent performance, but what really sealed the deal back then was its unbelievable \$7,990 sticker price. Consumers snapped up FZ-09s before they ever saw the light of a showroom floor, and Yamaha reportedly had a difficult time keeping up with the demand. And even with the price going up to \$8,190 for 2015 (and it stays the same for 2016), the 847cc triple continues to be the company's best-selling motorcycle.



That success certainly hasn't been lost on Yamaha's rival manufacturers. The only problem is the FZ-09's price advantage. We've been told that senior management from one of those competitors has been flummoxed in its efforts to figure out how Yamaha can produce the FZ-09 for such a low price.

Suzuki has been the first to challenge Yamaha's midsize standard bike supremacy with its "new" GSX-S750 for 2015 ("new" being a relative term, as the bike is basically the GSR750 that has been on sale in other world markets since 2011). With it selling for almost the exact same price—\$7,999—as the 2014 FZ-09, we had the opportunity to sample Hamamatsu's latest challenger ("Suzuki's New Standard," June/July '14), though rain at the press launch washed out any chance of really putting the bike through its paces.

So once we had the chance to get our hands on a GSX-S750 for a full test, we didn't hesitate to pit it against the current king of the midsize budget standards.

"New" Old School

The GSX-S and FZ have some distinct differences in ergonomics, even though their overall look appears the same. And there are advantages and disadvantages to each.

The Yamaha's handlebar is set higher and is wider than the Suzuki's comparatively narrow

handlebar (not to mention a difference in build: The FZ's handlebar is a nice tapered aluminum unit, while the GSX-S's handlebar appears to be a standard steel piece), and the reach to the Suzuki's bar is longer, putting the GSX-S rider's torso forward a bit more. Conversely, there's more legroom with the Yamaha, in addition to more room fore and aft on the seat compared to the Suzuki's two-piece rider/passenger setup. The Suzuki's seat has more padding and is slightly comfier than the FZ's comparative plank,

though the Yamaha's much narrower midsection enhances the FZ's lithe feel and allows you to plant your feet easier at a stop.

Taking off from a stop, the FZ's far superior torque output, nice clutch, and quick-revving engine mean you can holeshot traffic with ease, and while the Suzuki's retuned GSX-R engine provides decent low-end and midrange power that doesn't require any clutch-slipping antics, it needs more revs to get the same immediate acceleration of the Yamaha from lower speeds. Out on the highway,



TEST NOTES SUZUKI GSX-S750

+	Good chassis, suspension
+	Low sticker price
+	Smooth throttle response
-	Engine kind of boring
-	Needs to lose weight
-	Needs better brakes, different tires
=	If the FZ-09 didn't exist, the GSX-S would look a whole lot better

the inline-four of the GSX-S generates some vibration around 5,000 rpm; the FZ does too, but its three-cylinder vibes are more easily tolerated.

The Yamaha's more upright seating position combined with the lack of wind protection will have you tiring of being a windsail after about 30 minutes on the highway. Granted, long highway stints aren't exactly in the FZ's repertoire, not with its 3.7-gallon fuel tank; the Suzuki's slightly more aggressive riding position makes the wind blast a little more bearable, and you'll get farther on its 4.6-gallon tank.

The first section of twisty pavement is where we quickly found out that Yamaha has thankfully banished the majority of the abrupt throttle response that plagued the original FZ-09. Now you can run the FZ in Standard or even A mode without requiring the deftness of a brain surgeon when getting on the gas. "Every once in a while I get greedy and am ever-so-slightly reminded of this bike's quirky throttle, but those moments are few and far between," Associate Editor Bradley says of the Yamaha's newfound smoothness. There's still a hint of abruptness in A mode, but for the most part you're freed from the specter of throttle-induced chassis instability in the middle of a corner, letting you truly enjoy the responsive and robust character of the FZ's crossplane-crank triple.

Staying true to its GSX-R lineage, there's no



such throttle response issues with the Suzuki. It doesn't matter where or how aggressive you are with the throttle; the GSX-S's 749cc inline-four simply delivers power when you ask without any added drama.

But you could say that lack of drama is one of the Suzuki engine's letdowns. Compared to the lively power and acceleration of the Yamaha, the GSX-S's powerplant revs slower and lacks the responsive torque of the FZ's three-cylinder, making the Suzuki feel almost lazy by comparison.

And instead of getting better as the rpm rises like you'd expect with a GSX-R, the GSX-S just continues building power in a steady and linear manner—which is not a bad thing, mind you. It's just that it's not as enthralling to ride as the Yamaha. Also not helping in the acceleration department is the Suzuki's added heft; the GSX-S scales in almost 50 pounds heavier than the FZ, the Suzuki weighing in at 466 pounds wet.

Steering characteristics between the two bikes mirror the engine differences in a way.



TEST NOTES
YAMAHA FZ-09

+	Abrupt throttle response gone
+	Revy, torquey engine
+	Agile handling
-	Suspension still flaccid
-	Small fuel tank
-	Seat needs better padding
=	Still the best bang for the buck in motorcycling

The Yamaha is agile, light on its feet, and seemingly makes mid-corner line changes with the effort of a bicycle. The Suzuki requires a firmer input at the handlebar to initiate a turn, and while the steering effort tends to give an air of stability, it comes at the cost of needing much more effort to tighten up a cornering line or flick the bike through a fast transition. Some of the Suzuki's comparatively sluggish steering characteristics are likely due to its narrower handlebar, as well as the choice of OEM rubber; the OEM-spec Bridgestone BT-016 EE tires fitted to the GSX-S don't have nearly the same quick-steering habits of their off-the-shelf BT-016 brethren.

It's not all wine and roses in the Yamaha camp though. While the original FZ's throttle response issues were sufficiently addressed, apparently the first contract for OEM suspension bits isn't over yet because the same overly soft spring and damping rates from the original model haven't changed for 2015. Even with rebound damping cranked in to maximum at both ends, the instant you begin to get aggressive with the controls or your pace in the turns, the Yamaha begins pitching and wallowing on its suspension, forcing you to back off and wait for things to settle down.

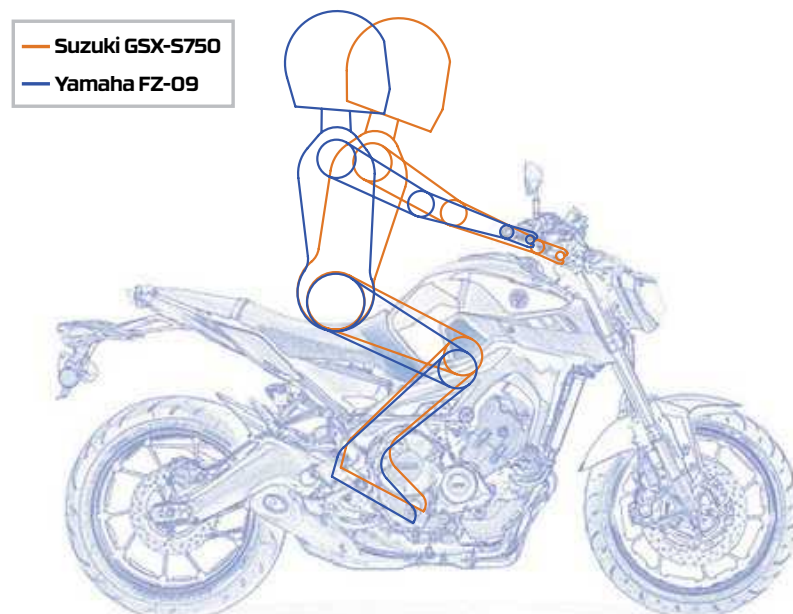
And yet, when you hit sharp bumps or nasty pavement on the FZ, a lot of the initial impact gets transmitted into the chassis. We'd say it's pretty easy to see where Yamaha saved some money in the bike's construction...

By contrast, the Suzuki's suspension (adjustable for spring preload only) has damping and spring rates that are dialed in much better for overall street and canyon work. Aggressive riding doesn't get the GSX-S all flustered like the FZ, with the chassis, suspension, and tires all working together to provide a nice, planted feel in the corners. There's good control throughout the suspension travel, and front-end feedback is surprisingly decent.

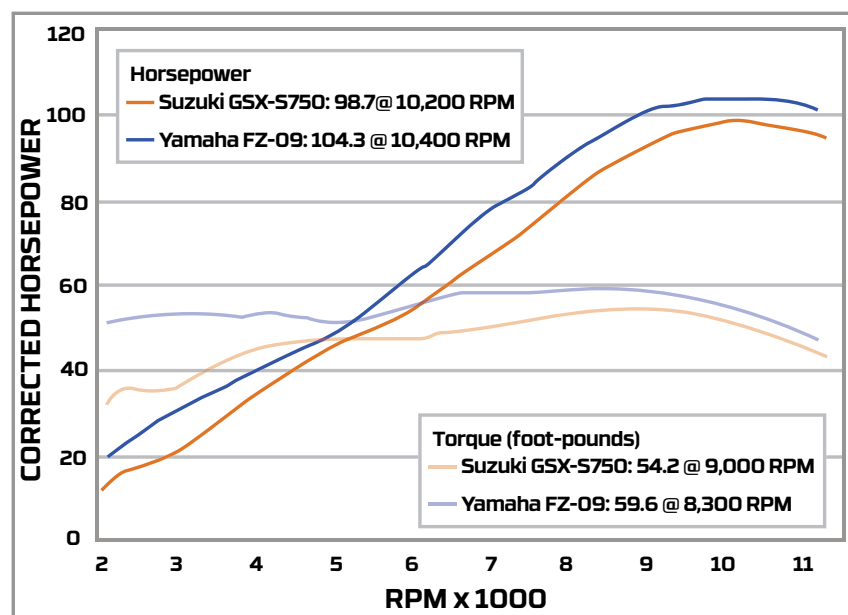
But all this canyon competence doesn't come at the expense of the ride over highway superslab or imperfect urban pavement either. Despite suspension rates being decidedly firmer overall than the FZ, the Suzuki doesn't punish you over sharp bumps in the city or frost heaves on the highway.

Braking from the Yamaha's dual four-piston Advics calipers/298mm discs combination is much stronger, with better initial bite and overall feel than the GSX-S's old parts-bin-refugee Tokico two-piston slide-pin calipers clamping on 310mm discs. The Suzuki's brakes require a lot more lever effort to get strong stopping power, and feedback is pretty numb compared to the FZ's setup, though we surprisingly noticed a little bit of fade in the Yamaha's brakes during more spirited canyon sorties. Interestingly, neither bike is equipped with ABS, another cost-cutting measure we're sure.

ERGOS



The Yamaha's higher bars and lower pegs mean more room and a more upright position for the rider.



The FZ-09's engine simply towers over the Suzuki's older-generation powerplant, and it also revs quicker to boot.



Suzuki definitely raided an older parts bins to get the Tokico two-piston slide-pin calipers for the GSX-S750. Despite only having adjustable preload, the fork worked well with dialed-in damping and spring rates.



Although the Suzuki's instrument panel with analog tachometer and LCD info panel is clean and easy to read, it looks rather dated and could use a refresh.



The GSX-S750's two-piece rider/passenger seat setup is more comfortable than the FZ-09's one-piece seat, but it also restricts the amount of fore/aft room for the rider.

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The Yamaha's four-piston Advics calipers and 298mm discs provide good stopping power and decent feel. Flaccid damping and spring rates unfortunately remain in the suspension.



The wider and higher-set bar of the FZ-09 provides good comfort and steering leverage but also puts you right in the windblast. We're still not fans of the tiny LCD instrument panel, but it does get style points.



SRO'S



Kent Kunitsugu

Age: 54

Height: 5'8"

I must say that I've been impressed with Yamaha lately.

These past few years the company has been coming out with new models that have basically created a lot of excitement in the marketplace, something it badly needed. And the buzz wasn't just because those new models were priced far below the competition; it was also because they had superb performance. The FZ-09 was the first of these new-generation models, and it's no surprise the bike continues to sell so well. The fueling update just makes it that much better. Suzuki should have known that it needed to have its ducks in a row with the GSX-S750 if it were ever going to have a chance against the Yamaha. Unfortunately, renaming a four-year-old European model just for its low price isn't going to cut it.



Bradley Adams

Age: 26

Height: 6'3"

The more time I spend on the FZ-09, and the more bikes I

ride that are meant to "compete" with it, the more I'm amazed by what Yamaha has done. A bike costing around \$8,000 should not look or work this well. I give credit to Suzuki for recognizing what Yamaha had done and wanting to challenge its position in the category, but just looking and sitting on the bike you can see where Suzuki missed the mark. The GSX-S is noticeably heavier as you balance it between your legs, and fit and finish is just not what it is on the Yamaha, with Suzuki very clearly relying on cost-effective components almost throughout. Sure, the suspension is better, but that hardly makes up for what the Yamaha offers in terms of steering quickness, styling, and, most importantly, fun factor.

A Tough Act To Follow

Despite its still-lingering soft suspension issues, the Yamaha FZ-09 continues to prove that its combination of great performance, quality build, and astonishingly low sticker price is very hard to beat. If the FZ never existed, we'd be looking at the Suzuki GSX-S750 in an entirely different light, especially with its low \$7,999 MSRP. But when paired up next to the Yamaha triple, the Suzuki's cost-cutting construction is readily apparent—and the majority of those parts affect its performance when compared to the FZ.

It looks like some upper management brass at the other OEMs are going to be pulling some more hair out trying to figure out how to build a bike for around \$8,000 that will beat the Yamaha FZ-09. Good luck with that. **SR**

RATINGS

Bike	Suzuki GSX-S750	Yamaha FZ-09
Fun to ride	8	9
Quality	7.5	9
Instruments & controls	8.5	8
Ergonomics	8.5	8
Chassis & handling	8.5	9
Suspension	8	7
Brakes	8	8.5
Transmission	9	9.5
Engine power	8	9
Engine power delivery	8	9
Ratings total	82	86

SPECS

Bike	Suzuki GSX-S750	Yamaha FZ-09
MSRP	\$7,999	\$8,190
ENGINE		
Type	Liquid-cooled, transverse, DOHC inline-four, 4 valves/cyl.	Liquid-cooled, transverse, DOHC inline-three, 4 valves/cyl.
Displacement	749cc	847cc
Bore x stroke	72.0 x 46.0mm	78.0 x 59.1mm
Compression ratio	12.3:1	11.5:1
Induction	SDTV, 32mm throttle bodies, single injector/cyl.	Mikuni EFI, 41mm throttle bodies, single injector/cyl.
CHASSIS		
Front suspension	KYB 43mm inverted fork, adjustment for spring preload, 4.7-in. travel	KYB 41mm inverted fork, adjustments for spring preload, rebound damping, 5.4-in. travel
Rear suspension	KYB shock, adjustment for spring preload, 5.3-in. travel	KYB shock, adjustments for spring preload, rebound damping, 5.1-in. travel
Front tire	120/70ZR-17 Bridgestone BT-016F EE	120/70ZR-17 Dunlop Sportmax D214 F
Rear tire	180/55ZR-17 Bridgestone BT-016R EE	180/55ZR-17 Dunlop Sportmax D214
Rake/trail	25°/104mm (4.1 in.)	25°/103mm (4.1 in.)
Wheelbase	57.1 in. (1450mm)	56.7 in. (1440mm)
Seat height	32.1 in. (815mm)	32.1 in. (815mm)
Fuel capacity	4.6 gal. (17.5L)	3.7 gal. (14L)
Weight	466 lb. (211kg) wet; 438 lb. (199kg) dry	418 lb. (190kg) wet; 396 lb. (180kg) dry
Fuel consumption	40-49 mpg, 45 mpg avg.	38-49 mpg, 43 mpg avg.
PERFORMANCE		
Quarter-mile	11.52 sec. @ 119.83 mph	11.29 sec. @ 123.71 mph
Roll-ons	60-80 mph/3.57 sec.; 80-100 mph/4.12 sec.	60-80 mph/3.22 sec.; 80-100 mph/3.57 sec.

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THE MISSING LINK

BMW aims its S 1000 four-cylinder platform into the “adventure sports” segment to take on Ducati’s Multistrada 1200

BY KENT KUNITSUGU PHOTOGRAPHY BY KEVIN WING

» Despite having the “traditional” adventure bike market covered with its ubiquitous R 1200 GS/Adventure boxer twin variants, BMW has certainly taken notice of what it calls the “adventure sports” segment. This spin-off category consists of bikes that have more sportbike bloodlines than off-roading intent—and the one bike that exemplifies the class better than any other is Ducati’s very successful Multistrada 1200. Instead of spending a lot of time and effort trying to modify the GS in order to tap into this market, Munich HQ decided it could more easily get into the game with its four-cylinder S 1000 platform, resulting in the new S 1000 XR.

Utilizing the same 999cc, DOHC, liquid-cooled inline-four engine as the S 1000 R naked bike introduced last year means the XR’s powerplant is good for a claimed 160 hp and 83 foot-pounds of torque. That’s certainly a far cry from the boxer twin and on par (horsepower-wise, at least) with the Multistrada. The same basic aluminum perimeter frame from the R model has been subtly tweaked to work with the demands of the taller adventure-tour regimen, with a more relaxed steering-head angle (0.9 degree more rake at 25.5 degrees) and longer trail (117mm from 99mm). The taller, longer-travel suspension (1.2 inches more in the front, 0.8 inch in the rear) in addition to the relaxed steering geometry and 2.5-inch-longer swingarm contribute to a much longer (4.3 inches!) wheelbase at 61 inches.

A tapered aluminum motocross-style handlebar and more spacious ergos provide the more typical upright riding position of the ADV genre, with decent wind protection courtesy of a sculpted half-fairing sporting the trademark asymmetrical headlight styling of the S 1000 series and a two-position

manually adjustable windscreen. That aforementioned longer-travel suspension (available with the latest-generation BMW Dynamic Electronic Suspension Adjustment semi-active suspension as an option) makes for the usual tall ADV seat height of 33.1 inches—though in addition to an optional 33.7-inch high seat, the XR also has an optional 32.3-inch low seat, as well as a lowered suspension with D-ESA option that drops it even further to 31.1 inches.

That suspension holds 17-inch cast-aluminum hoops (in 3.5-inch front and 6.0-inch rear widths) shod with Bridgestone’s latest-generation T30 sport-touring rubber in 120/70 and 190/55 sizes, a choice that shows the more pavement-oriented intentions of the XR. The XR also retains the braking system of the R model, with dual 320mm discs clamped by Brembo four-piston calipers up front and a single 265mm disc gripped by a two-piston sliding caliper out back.

BMW’s ASC (Automatic Stability Control) utilizing the company’s normal traction control and ABS comes standard on the XR, but as usual, a number of optional packages can substantially expand that electronic rider aid packet. Chief among these is the Ride Modes Pro option that augments the standard Rain and Road modes with Dynamic and Dynamic Pro modes that provide much more direct engine response along with the more advanced Dynamic Traction Control and new ABS Pro (the first BMW to be so equipped) that can sense lean angle and adjust DTC and ABS intervention to suit. The Ride Modes Pro option also includes firmer base settings for the Dynamic ESA in the Dynamic and Dynamic Pro ride modes.

If you were expecting a more comfortable and roomy S 1000 R with



If you were expecting a more comfortable and roomy S 1000 R with decent wind protection and more versatility with the new XR, well, you'd be right.

decent wind protection and more versatility with the new XR, well, you'd be right. Ergos are the usual ADV upright, with room to stand on the pegs if necessary; we did, however, notice a bit of excessive vibration around 4,500 rpm at cruising speeds on the highway that got the handlebars and pegs tingling.

Even though it's hauling nearly 50 more pounds than the R, the XR has the same arm-straightening midrange acceleration as its naked cousin. As far as top-end, we couldn't tell because our bike only had 6 miles on the odometer when we began the press launch ride in the Muskoka Lakes region of Ontario, Canada, so our XR was factory rev-limited at 9,500 rpm due to not reaching the designated break-in mileage. It also rained for the duration of our ride, which, while allowing us to discern that the DTC does a superb job of keeping the BMW under control on slippery surfaces, also prevented us from letting the inline-four to really stretch its legs.

Nonetheless, we were able to discern the XR's throttle response is nice and smooth in any of the riding modes despite having 160 hp on tap, and the powerband is linear and very usable. In addition to our BMW having the Ride Modes Pro option, it also was equipped with the latest Gear Shift Assistant Pro quickshifter that allows both clutchless upshifts and downshifts. As with the newest S 1000 RR that we tested last issue, the GSA Pro worked well for the most part on upshifts; unfortunately, similar to the RR's unit, downshifts required a lot of lever effort (so much that our foot



A high-set motocross-style handlebar provides a comfortable riding position whether sitting or standing. The instrument panel is typical S 1000 fare, with an analog tach paired with a well-organized LCD info panel. GPS above dash is a \$799 option.

slipped off the rain-soaked lever several times), with a numb gearshift feel.

Overall handling felt basically the same as the R, despite the longer wheelbase and more relaxed steering geometry, which is likely attributable to the higher and wider handlebar of the XR delivering more leverage. The Dynamic ESA did a superb job of adapting to the riding situations it encountered, providing a smooth ride over nasty pavement while keeping the long-travel suspension from pitching too excessively and getting the chassis tied up in knots when ridden aggressively. And we were glad to see that the XR's brakes were nowhere near as grabby and abrupt as the

2016 BMW S 1000 XR

MSRP \$16,350 base model; \$18,750 as tested

ENGINE

TYPE	Liquid-cooled, DOHC, inline-four, 4 valves/cyl.
DISPLACEMENT	999cc
BORE X STROKE	80.0 x 49.7mm
COMPRESSION RATIO	12.0:1
INDUCTION	BMS-X EFI, 48mm throttle bodies, dual injectors/cyl.

CHASSIS

FRONT TIRE	120/70ZR-17 Bridgestone Battlax T30F EVO
REAR TIRE	190/55ZR-17 Bridgestone Battlax T30R
RAKE/TRAIL	25.5°/4.6 in. (117mm)
WHEELBASE	61.0 in. (1549mm)
SEAT HEIGHT	33.1 in. (841mm)
FUEL CAPACITY	5.2 gal. (20L)
CLAIMED WET WEIGHT	502 lb. (228kg)



The same dual 320mm disc and Brembo caliper setup from the R is on the XR—but thankfully minus the abrupt bite and highly progressive response. Fork action from the Dynamic Electronic Suspension Adjustment handled all situations well.

R model's binders, offering much more linear feel and power; we weren't brave enough to really test the ABS Pro in the corners on wet pavement, but the system worked well at keeping us out of trouble in the situations we did encounter.

BMW isn't looking to eventually supplant the GS with the XR, as it feels they are two different markets. In fact, in a manner similar to the S 1000 RR, BMW looks at the S 1000 XR as an "acquisition" model, one that will attract new customers to the brand (something the RR did very well). Is it good enough to steer a prospective "adventure sports" rider away from the Ducati Multistrada 1200? We'll find out soon enough. **SR**



BOXER RESURRECTION

BMW brings back the RS sport-touring model using the new-generation boxer engine

BY KENT KUNITSUGU PHOTOGRAPHY BY KEVIN WING

» Flashback to 15 years ago, when the sport-touring market was vibrant and healthy and every manufacturer offered at least one model that combined twisty-road performance with long-haul comfort and convenience. There was plenty of variety to choose from, and it seemed there was a bike for every kind of rider.

But a funny thing happened on the way to the present day—the sport-touring market started shrinking, largely because of the growing popularity of the adventure-tour genre of bikes. Apparently many of those sport-touring riders liked the more upright ergos of the ADV machines to go along with that long-haul competence, plus the added bonus of some minor off-road capability. BMW was one manufacturer that generated a lot of sales catering to this burgeoning segment with its GS series of boxer twins, so it was a bit of a pleasant surprise to see the company bringing back the sport-touring boxer twin after a decade of dormancy with the new R 1200 RS for 2016.

Utilizing the same new-generation 1,170cc boxer twin with liquid-cooled cylinder heads producing a claimed 125 hp and 92 foot-pounds of torque as the rest of the R 1200 series, the RS model also gets the new inverted conventional telescopic fork as the R model (reviewed elsewhere in this issue) instead of the Telelever front end found on the GS and RT variants. The RS also retains the Paralever single-sided swingarm/shaft drive unit found on all the boxer twin models, with the two-part, tubular steel bridge-type frame sporting nearly identical numbers to the R (same rake angle with a smidgen more trail, plus a half-inch longer wheelbase at 60.2 inches).

Rolling stock is also the same as the R model, with 3.5 x 17-inch front and 5.5 x 17-inch rear cast-aluminum hoops shod with Metzeler's Roadtec Z8 Interact tires in 120/70ZR-17 and 180/55ZR-17 sizes, respectively. Ditto for the brakes, with dual 320mm discs and radial-mount Brembo four-piston calipers up front and a single 276mm disc gripped by a two-piston sliding caliper in the rear.

A nicely sculpted half-fairing with two-position manually adjustable windshield (similar to the S 1000 XR ridden elsewhere in this issue) directs the airflow around the rider, with a “poised yet relaxed riding position” courtesy of a forged aluminum plate with stubby clip-on-style bars bolted to the top of the upper triple clamp via risers. As with most of the latest BMWs, the RS's 32.3-inch seat height can be adjusted lower or higher via different accessory seats; besides two “low” options of 29.9 inches and 31.1 inches, there is also a higher 33.1-inch “sport” seat available.

Also in keeping with the new-generation BMWs, the RS comes standard with the company's ASC (Automatic Stability Control) electronics using both traction control and ABS for safety nets, along with a plethora of optional upgrades to further expand the bike's capabilities. These include the Ride Modes Pro option that adds Dynamic and customizable User modes to the standard Road and Rain ride modes, as well as adding lean-angle-sensitive Dynamic Traction Control to the mix. Dynamic ESA (Electronic Suspension Adjustment) is also available and provides a semi-active suspension feature, similar to the R model.

The RS's riding position feels much more natural than the R's, with just enough forward cant to your torso to make use of the good wind protection from the fairing without putting excess pressure on your wrists. The two-way-adjustable windscreen works pretty well in the upper position, keeping the windblast off your helmet and chest. While the majority of the RS's cockpit is nicely laid out and easy to work with, we're not big fans of the R 1200 series analog speedometer/LCD info panel combo; the tachometer is the usual LCD bar graph that is hard to discern at a glance, and the same could be said for the analog speedometer with small numbers grouped close together. Curiously, the info panel can be switched to several displays, one of which includes a digital speedometer...

Power from the new-generation boxer engine is smooth and amiable off

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FIRST RIDE 2016 BMW R 1200 RS



“...on a bike like the RS with its sportier intent, you can definitely feel the difference (the Dynamic ESA) makes during all aspects of cornering.”

2016 BMW R 1200 RS

MSRP \$14,950 base model; \$18,919 as tested

ENGINE

TYPE	Liquid-/air-cooled, DOHC horizontal opposed twin, 4 valves/cyl.
DISPLACEMENT	1170cc
BORE X STROKE	101.0 x 73.0mm
COMPRESSION RATIO	12.5:1
INDUCTION	MS-X EFI, 52mm throttle bodies, single injector/cyl.

CHASSIS

FRONT TIRE	120/70ZR-17 Metzeler Roadtec Z8 Interact M
REAR TIRE	180/55ZR-17 Metzeler Roadtec Z8 Interact C
RAKE/TRAIL	28°/4.8 in. (122mm)
WHEELBASE	60.1 in. (1527mm)
SEAT HEIGHT	2.3 in. (820mm)
FUEL CAPACITY	4.7 gal. (18L)
CLAIMED WET WEIGHT	519 lb. (235kg)



Brembo radial-mount calipers and 320mm discs provide excellent stopping power, and the ABS is fairly transparent. The Dynamic ESA-equipped inverted fork worked well, resisting dive on the brakes but allowing just enough for proper weight transfer and tire grip.



A nicely sculpted half-fairing sports the asymmetrical headlight styling of the S 1000 series; a two-way manually adjustable windscreen (simply pull up or push down with two hands) provides decent wind protection.



We're not big fans of the R 1200 series' instrument panel layout of analog speedometer with the LCD info panel. Strangely enough, one of the three individualized LCD displays available with the OnBoard Computer Pro option has a digital speedometer...

the bottom, as it progresses in a linear fashion up into a surprisingly strong midrange that gets the RS scooting along quite nicely. Our bike was equipped with the Ride Modes Pro option that unlocks the Dynamic mode to provide the most aggressive throttle response and the least amount of DTC intervention, and these features came in handy during a spirited ride along an undulating country road loaded with imperfect and sometimes dirty pavement. As part of our bike's Premium Package option, the Gear Shift Assistant Pro that allows clutchless upshifts and downshifts is included, and as with the R 1200 R also reviewed in this issue, it worked well, permitting us to concentrate on more important cornering tasks.

That Premium Package also includes the

Dynamic ESA option, and on a bike like the RS with its sportier intent, you can definitely feel the difference it makes during all aspects of cornering compared to the standard Road setting. The semi-active damping is especially apparent during hard braking, where it stiffens up the front end enough to prevent excessive dive while still allowing good compliance. Steering habits were fairly quick yet neutral, with a smidgen more effort required for turn-in compared to the R (likely due to the R's better leverage with its higher and wider handlebars), and overall stability was excellent. Our only gripe with the D-ESA would be a little bit of harshness over sharp-edged bumps, something we also found on the similarly equipped R model.

Overall braking performance at both ends

with the standard ABS package was very good, handling aggressive braking in both wet and dry conditions with equal aplomb. Feel and feedback from the front brakes was more than adequate, even when ABS intervention commenced. And the Metzeler Roadtec Z8 Interact tires provided good grip (on both wet and dry pavement) and decent bump-absorption qualities.

Although we're glad to see that BMW has brought back the midsize sport-tourer R 1200 RS, we're also hoping there's a big enough market for it to help resurrect the class. We like the versatility and all-day comfort of an adventure-tour bike as much as anyone, but you just can't attack a good twisty road like you can on a good sport-tourer like the RS. Here's hoping that BMW's reason for bringing the RS back pays off. **SR**

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IT'S GOOD TO B-KING

THE STORY BEHIND MY GRANDPA'S TURBOCHARGED SUZUKI B-KING

BY BRADLEY ADAMS PHOTOGRAPHY BY DREW RUIZ



It's a little after 9 p.m. by the time my grandpa Ray and I finish dinner, get geared up, and are back on our bikes. We've been on the road for almost 10 hours at this point, joking with each other for at least three-quarters of that time and eating the rest. The stretch of Southern California pavement we're rolling across was littered in brake lights and irate drivers just a few hours ago, but it is now almost entirely empty. Home is getting closer by the minute, and yet even after a full day of aimless riding, bonding, and sweating, I wouldn't mind if it were a little farther. All I can think right now is that this is as good as life gets on two wheels and that I'm entirely content with the sub-speed-limit pace that allows my grandpa and me to make the most of our time left together. Up until now, I thought my grandpa felt the same.



MG



IT'S GOOD TO
B-KING

My grandpa, ever the storyteller, tells me about one of his first experiences with forced induction: “My one dump truck had a two-cycle engine with a supercharger *and* a turbocharger. After work I used to take it to the dragstrip, and I even won bracket races with it. I needed to have a foot on the brake and the clutch because it’d creep, which made launching it tough, so after a few races I took a piece of wood about a foot and a half long. I held that in my hand and pressed the brake with it. When the first amber came on I’d let go of it and throw it on the ground. Yeah, my dad wasn’t too happy about me racing the truck we were supposed to be making a living with.”

But then there was a car.

It’s not a particularly special car, a Toyota Corolla or something equally as insipid that I imagined we’d sit behind whilst still enjoying our leisurely stroll home. We’re in no hurry, I remind myself, just as from the corner of my eye I see my grandpa, who is an ex- (and in his head, current) dragracer, whack the throttle open on his turbocharged Suzuki B-King and almost simultaneously blow past me, the car, and a mile marker or two, as if this were some kind of race.

And then I realize that, to my grandpa, *it is a race*. I realize that he built this B-King for these split seconds of pure, unadulterated fun. For winning. And for having something that makes him laugh inside his helmet, which I can only imagine he’s doing right now, all the while thinking, “Yeah, I kicked their asses.”

Answering The Question Of Why

There is more to the story, my grandpa says earlier that day over lunch, and in response to me asking the most obvious question: Why? Why a B-King and why in God’s name does said B-King need a turbocharger?

“There are a bunch of reasons why I bought the B-King,” he begins. “I like an R1 or a GSX-R just as much as the next guy, especially the speed. I just don’t want to ride those bikes anymore; they’re too uncomfortable for me. I liked the seating position on the B-King; you’re leaned over a little bit but not a lot. I knew I wanted something that was pretty comfortable and had a lot of horsepower, and when I bought the bike there weren’t really a lot of options. I knew it wasn’t the best-looking thing out there, but at least you didn’t see another one coming down the road every five minutes like you do with a GSX-R. And I’m happy; I don’t mind if people like the bike or they don’t. I like it. Even before the turbo.”

Which of course leads to the second half of my question: Why put a turbocharger on a bike that makes 160 hp right off the



Suzuki’s B-King rolled off the showroom floor weighing right around 580 pounds, and my grandpa admits that there are better, lighter options for when a road tightens up. Nevertheless, he says he has never regretted buying the B-King. “I like it. Even before the turbo.”



Over the years I have learned that my grandpa is a bit of a contradiction; he’s almost never in a hurry but completely infatuated with going fast. Safe to say his B-King satisfies the second half of his personality.

showroom floor?

"You know, my whole life I had wanted something with more horsepower than I really needed. So I built it," he says. "I just wanted the bike, when I turned the throttle on it, I wanted the thing to try and freakin' throw me off. I've just always liked going fast. I never really liked going around corners very fast. That took me a while to do, and I didn't really get that until I started road racing. [Fun fact: My father got my grandpa into road racing at the ripe age of 41.] But on a straightaway, hell, I'll run the thing as fast as it'll go. I have just always loved the feeling of doing that, and this bike only makes that more fun for me."

Updates to the B-King came in stages but not surprisingly started at cosmetics. First to go was the horrid exhaust mufflers and license-plate hanger that came standard on the B-King, replaced by Yoshimura R&D components that tidied up the rear of the bike. Up front, my grandpa has also added a National Cycle VStream Sport Windscreen for better aerodynamics and, thus, less strain on his upper body while running down the freeway, at speed... He considered removing the Yoshimura mufflers once the turbo was installed but ultimately decided there was too much space between the rear wheel and fender and that it didn't look right. They remain but are not hooked up. "I could probably get a pipe built that connects the turbo to the cans, but that would rob some horsepower, and that stuff cost me too much money to let go that easy," he jokes.



My grandpa says he always wanted something with more horsepower than he really needed. Now he has it. And he can't stop smiling.



One of these things is not like the other. And, no, we're not talking about maturity level of my grandpa and me; that's about the same.

IT'S GOOD TO
B-KING



Mickey Cohen, the man behind the B-King build, says he could put a spacer for the base gasket and then turn the boost up to 10 pounds, which would have obvious horsepower advantages. “The bike would be just as reliable because you’re pulling some of the compression out of it.” I never thought I’d hear my grandpa say no to more power, but for now, he’s shot the idea down.

More Than Money

Admittedly, the turbocharger kit and install cost more than money (read: blood, sweat, and tears), even if Mickey Cohen of Mickey Cohen Motorsports, the man responsible for the install, won’t admit to the latter part.

“I had always wanted something turbocharged or supercharged,” my grandpa says of the build’s beginnings. “I went back and forth for a bit then I called Mickey up and asked him about what he thought about doing the turbo. He said, ‘Oh, yeah, that’ll be easy. Won’t be anything.’”

Cohen, looking back at the build, admits it was more than he could have planned for: “Well to start, we ordered this kit from a company called Velocity, which was originally a mom-and-pop-type company but was sold just about a year before we put our order in. So first off, with the new ownership, it took like eight months just to get the kit—which Velocity had previously had a really good reputation. Then the kit showed up in a box, with stuff for water injection, hoses for cars, boost controllers, all this stuff that we didn’t order. And nothing fit. I mean nothing. The turbo and the header didn’t even mount to the motor, so we had to cut all that and re-weld it so it fit. It took us almost a week to basically re-engineer the kit. It was just a mess. Then, finally, we got the bike running. It fires. Sounds pretty good, actually.

“Unfortunately, with that kit, there was no reflash for the ECU, so at that point I had to go in and start working with the Power Commander we had on the bike, and basically I just had to flood the Power Commander so that we were getting fuel to the thing and could make a pull on the dyno,” Cohen continues. “We do that and get it on the dyno, and it all seems good at this point. I’ve got the boost gauge on it, air fuel gauge; I’ve got all this stuff there and I’m watching it. Then I go to pull it, and when I get to like 6,000 or 7,000 rpm, right where it’s just coming into boost, the pop-off valve falls off the turbo. The only part we *didn’t* touch falls off. So we go back and start checking everything again. And I think right there we were already worried.

“We recheck everything, and when we’re done with that we make one pull at 100 percent,” Cohen continues. “And, man, it was singing. We honestly couldn’t believe how hard it pulled. All we could think was, ‘Man, let’s do that again.’ So we pull it again and then, *boom*... The thing explodes right there



The turbocharger kit was purchased from Velocity, for a stock-engine B-King, but ultimately needed work. In the end, Cohen had to turn to RCC Turbos for help with parts, plus rebuild the B-King engine after it came apart on the dyno, due to the original kit being sent with a 14-pound spring.



While the B-King build gave Cohen fits, he has since built another (yes, Suzuki actually sold more than one B-King), using a kit specially built by RCC Turbos. “Richard doesn’t actually make a kit for the B-King,” Cohen reveals, “but I called him, told him I got another one in, and asked if he could put a kit together. He calls me back to say he’ll have one at my door in three weeks. It had a flashed computer and was done really, really well.”

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IT'S GOOD TO
B-KING



on the dyno. It just lifted the head right off the engine and started dumping coolant on me.

"From there I was just trying to get away from the thing as fast as I could. The water was spraying out the side of the engine, and I've got my leg coming over the tank while at the same time I was hitting the stop button on the dyno," Cohen recalls. "I'm trying to get out of the room and run outside to the hose. When I get there, I look at my leg and it looks pretty normal, but it's just hot, so I've got it under the hose. I take it out for a second, and it's still hot. After a while I'm like, 'I think I better go to the ER 'cause, oh, s—t, it's still hot.' My leg wasn't in the coolant spray very long, but it burned me pretty damn good. I wasn't able to work for a week or so, and sleeping was basically impossible. Yeah, it was pretty bad.

"The most frustrating part though was that I'm sitting there in the emergency room and still didn't know what had happened," Cohen continues. "I'm thinking, 'Why did this thing blow up?' So when I get back, I email TiAL, who makes the spring for the pop-off valve that was included in the Velocity kit, and give them the serial number for the spring. They email me back and tell me it's a 14-pound spring that Velocity had sent us. And remember this is a stock engine that we ordered the kit for! So, yeah, there was just way too much boost because of that spring they sent for the turbo and it pushed the head right off."

The top end, at this point, was a write-off.

"It melted pistons to the liners and then to the valves," Cohen says. "The whole top end was just one piece, basically. I had to beat it apart with a mallet. On two pulls it did that, that's how hot the thing got. So at that point we had to go through and rebuild the engine. I went and put rods, bearings, pistons, a cylinder, cylinder head, and all the valves in it. The crank was okay. I just did the rods because the top of the pistons got so hot. I figured the small end of the rod might not be so round anymore. It got really, really hot, but, boy, did it haul ass. Right now it's got an 8-pound spring in it. That's really the lowest I could bring it down to because the turbo they sent us is so big. So it makes 265 to 270 horsepower with 165 foot-pounds of torque at around 6,500 rpm."

Unfortunately, even with the bike back together, the job wasn't done.

"Even after we got everything put back together, Ray is calling me and saying that the thing has a lag in it—that he's going to get hurt," Cohen



A Yoshimura R&D exhaust was installed a few years before the turbo and helped tidy up the rear of the B-King. Interestingly enough, the cans remain for the same reason (though not hooked up to header pipes).



My grandpa Ray says you can tell when the front wheel is about to lift based on the sound of the engine, at which point you can roll out of the throttle a touch to keep both wheels on the ground. I heeded his warnings about wheeling the bike, for most of the day at least.



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IT'S GOOD TO B-KING

remembers. "So I got in touch with Richard at RCC Turbos. I called him and said, 'Dude, you've got to help me out here.' I told him what was going on, and, in the end, we ended up changing the whole fuel system over from the stuff Velocity had sent to a kit he has. Richard's kit comes with a return-style fuel rail, so you take the stock system apart and put his in. Then I gave him the ECU and he reflashed it. He made it so that the upper injectors fire the same amount of fuel as the lower injectors do. Plus he made the injectors fire at the same time, so now if I add fuel to the lower, it adds fuel to the upper at the same time. It just made it so we didn't have to add a bunch of fuel, to where we didn't have to make part of the map to where it was totally lean because of low fuel pressure to make the other half good. It made it like a stock bike, and so then we just had to fine-tune the map with the Power Commander, which we did. And now it's completely smooth."

I stole the key to the B-King for a better half of a day and can attest to the smoothness. The bike fuels better than a good amount of today's production motorcycles and still rides just as a stock B-King would below 5,500 rpm, which is a testament to Cohen's tuning. Past 5,500 rpm things change rather dramatically, with the B-King eating up pavement like it's going out of style and seemingly wanting to rip your arms from the handlebar. Just how hard does the bike pull? Hard enough that my grandpa has written off letting anyone ride on the passenger seat because, according to one "friend" who went for a ride, "I was just a few seconds away from not being able to hold on anymore." The fact that my grandpa can't bring chicks home on the back is probably the thing he likes least about the B-King...

You really have to have a screw loose to want something this fast. And my grandpa does, though when I ask him if he wants more, he shows a

sense of better judgment and maturity I admittedly did not expect: "No, I don't want any more. It's honestly as fast as I would want. I wouldn't want any more horsepower."

The Honest Truth

At roughly 580 pounds stock, the B-King is not the lightest motorcycle, and when a road starts to tighten up you really begin to feel the weight. To this end, my grandpa admits it's not the best motorcycle for day-to-day abuse. "It's not a lot of fun in the canyons," he says toward the end of dinner. "I'd like to get something light for any type of canyon riding and just keep my B-King for the street or rides with a lot of freeway. I love opening it up there."

Now just a few miles from home and with another car in front of us, I'm about to be reminded of just how much he loves it. And of how good it is to B-King. **SR**



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ALL ABOUT GEOM



Mechanics check the front and rear weight of Ben Spies' Yamaha M1 during a MotoGP test. This data can be used to calculate the horizontal position of the combined bike/rider center of gravity. A slightly more elaborate method, using scales at different heights, can be used to find the vertical CG position.

AFTERY



What the important numbers mean, how to change them, and why you would want to

BY ANDREW TREVITT



Quite often in *Sport Rider* road tests and comparisons we refer to various aspects of a bike's geometry—rake, trail, wheelbase, center of gravity, anti-squat, and so on—without offering an explanation as to what we are actually referring to or why it's important. Just as it means in the mathematics world, geometry here refers

to the physical measurements of a motorcycle's chassis. There are a handful that go a long way to determining how a bike handles, with some—like rake and trail—being direct measurements but others—such as anti-squat—being a combination of dimensions rolled into one handy reference value.

ALL ABOUT GEOMETRY

When it comes to setting up a motorcycle, the difficulty we usually run into is that changing just one of these variables impacts many others down the line, and it's easy to lose your way. In this issue we've put together a guide to the important dimensions and attributes that make up a motorcycle's geometry, with explanations as to what aspects of handling those attributes affect and how to make adjustments to change them. This knowledge can go a long way to keeping you from wandering down those dead-end setup paths we are trying to avoid. In our next issue we'll put that information into practice with a setup guide detailing handling symptoms and how to address them with adjustments based on the material covered here.

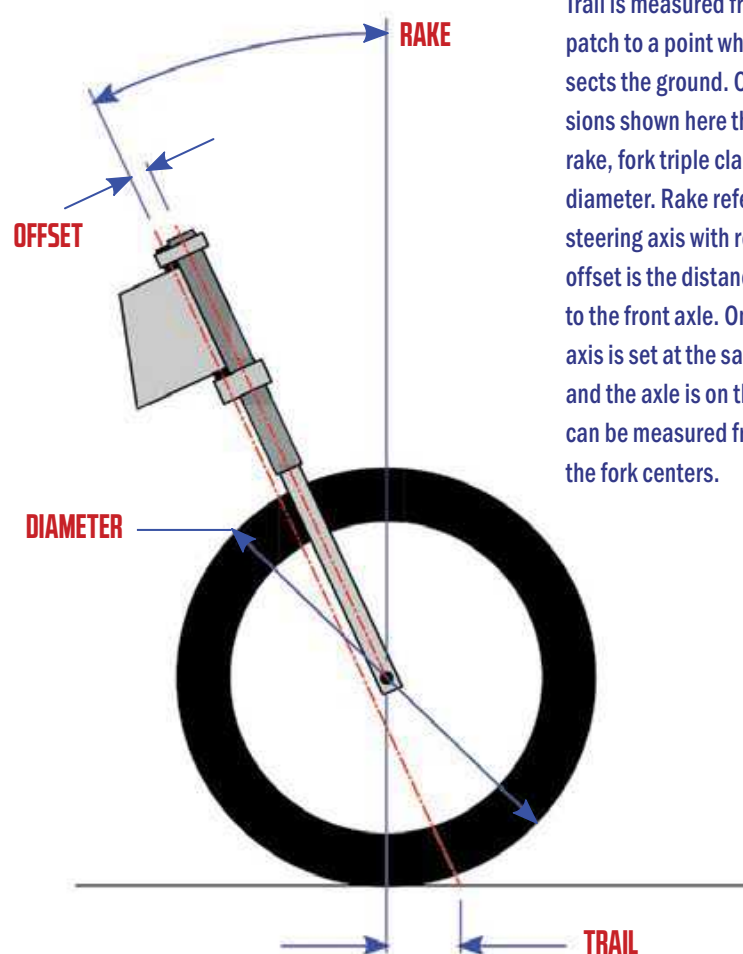
Front Geometry: Rake And Trail

At the front of the bike, it's trail that largely determines how a bike steers and how stable it is on the road. Trail is defined as the distance the front tire's contact patch is behind (or "trails") the intersection of the steering axis with the ground. More trail generally gives heavier steering effort but more stability, while reducing trail makes steering lighter with less stability. Rake is important in that it is one of the parameters that sets trail.

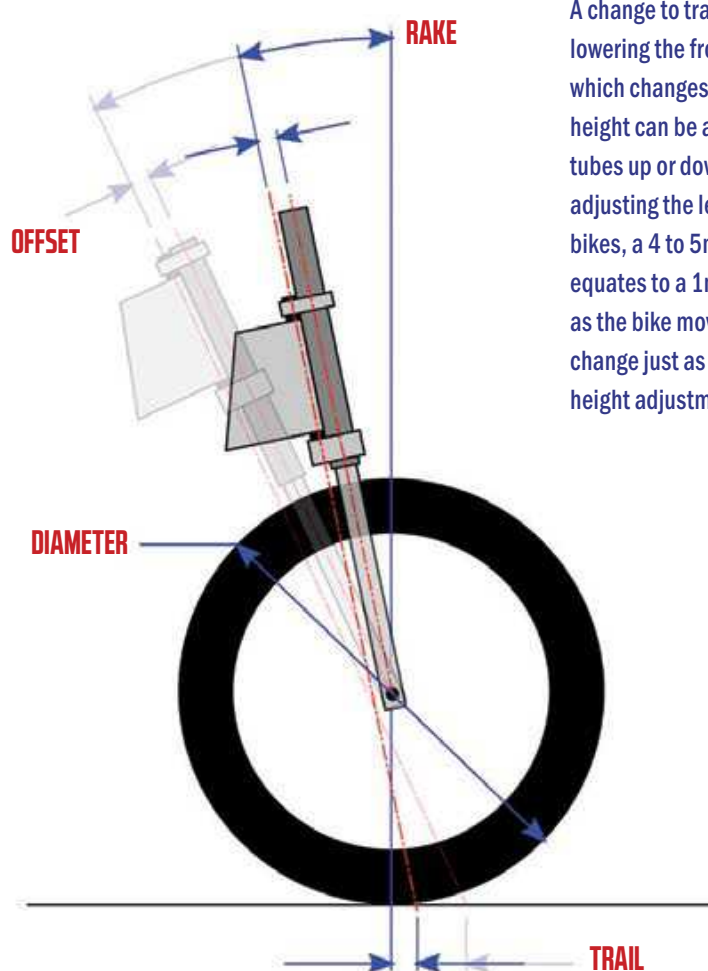
While we cannot adjust trail directly, we can by changing one of the three dimensions that directly affect trail: rake, offset, or front-tire diameter. Fitting a larger front tire, increasing rake, or decreasing offset will all add trail to some degree. On a streetbike with limited adjustments, unfortunately, we can't change these dimensions directly and have to resort to even more indirect methods. The most common way to adjust trail is to change rake by raising or lowering the front or rear of the bike, which alters the angle of the entire chassis, including the steering axis. This is typically accomplished by sliding the fork tubes up or down in the triple clamps, but some bikes have an adjuster on the rear shock; extending or shortening the shock length will change ride height, an amount determined by the linkage ratio.

We refer to these changes as ride-height adjustments, which you can measure in a number of ways. Typically we track front ride height by measuring how much fork tube protrudes from the top triple clamp and rear ride height by measuring from the rear axle vertically to a point on the subframe. In summary: You can add trail by raising the front of the bike or lowering the rear of the bike, either of which increases rake; note that if you raise the front end, the fork tubes would be lower in the triple clamps, giving a smaller number if you track ride height this way.

On racebikes, there are usually alternatives to consider: Adjustable triple clamps allow the offset to be changed, inserts in the frame can be used to adjust the steering head angle to directly affect rake, or a different tire could be fitted.



Trail is measured from the tire's contact patch to a point where the steering axis intersects the ground. Other important dimensions shown here that directly affect trail are rake, fork triple clamp offset, and front-tire diameter. Rake refers to the angle of the steering axis with respect to vertical, while offset is the distance from the steering axis to the front axle. On most bikes, the steering axis is set at the same angle as the fork tubes and the axle is on the fork centerline; offset can be measured from the steering stem to the fork centers.



A change to trail can be made by raising or lowering the front or rear of the motorcycle, which changes the rake of the chassis. Ride height can be adjusted by sliding the fork tubes up or down in the triple clamps or adjusting the length of the shock. On most bikes, a 4 to 5mm change in ride height equates to a 1mm change in trail. Note that as the bike moves on its suspension, trail will change just as if you were making a ride-height adjustment.

Rear Geometry: Anti-Squat

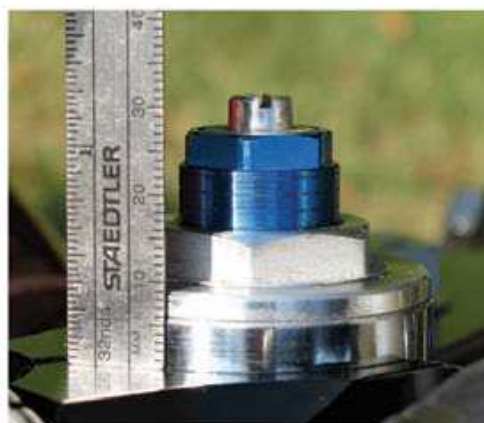
As bikes become increasingly powerful, the effects squat and anti-squat have on handling become more pronounced. Squat refers to the tendency for the rear suspension to compress on acceleration, as load transfers to the rear of the bike. Countering that tendency is anti-squat, a characteristic of the chassis that tries to extend the rear suspension on acceleration.

The anti-squat effect is a combination of two forces. The first is the driving force of the rear tire, which acts to extend the rear suspension provided the swingarm slopes up from the rear wheel to the pivot. Picture the front of the motorcycle blocked against a solid wall; if you were to push directly on the rear axle forward, the upward angle of the swingarm would cause the rear suspension to extend. The second force is from the chain pulling on the axle in a direction parallel to the top chain run, which also acts to extend the suspension in most cases. The magnitude of the chain force's anti-squat contribution depends on the angle of the chain relative to the swingarm and how far the chain run is from the swingarm pivot.

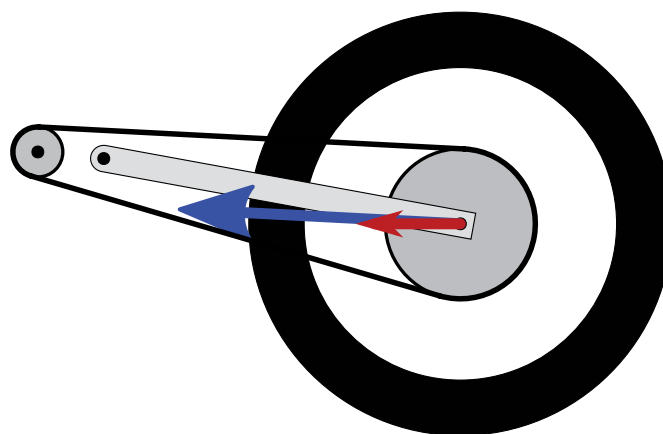
There are many ways to express the magnitude of the anti-squat effect. The simplest is to use a percentage to indicate how much weight transfer is offset by anti-squat. For example, if anti-squat is 75 percent, its effect offsets 75 percent of the weight transfer on acceleration and the suspension would still compress some amount. At 100 percent anti-squat, the weight transfer is perfectly offset and the suspension would not move due to weight transfer. And at more than 100 percent anti-squat, the suspension would extend on acceleration. This number can be calculated if you know the exact location of the front sprocket in the chassis along with some other dimensions.

Anti-squat is important for handling, as it can be used to change the chassis' behavior on the exit of a turn. In general, we want some squat to load the rear tire for traction but not so much that the front tire loses traction and causes you to run wide.

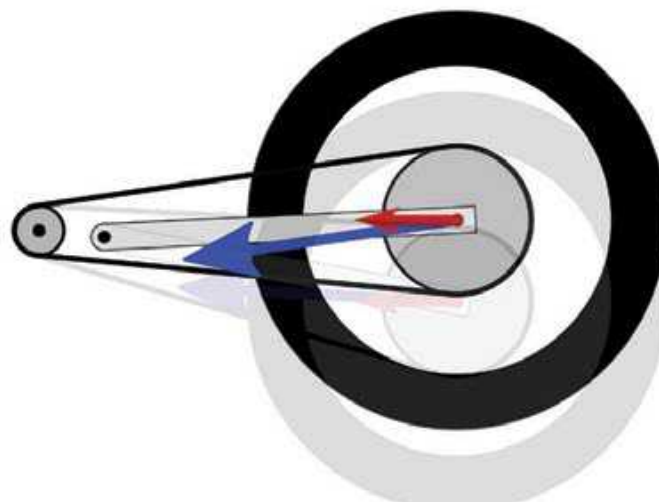
Adjusting anti-squat is a matter of changing the parameters that affect the swingarm angle or chain angle. That means raising or lowering the rear end to change swingarm angle, changing gearing to alter the chain angle or distance from the pivot, or adjusting the pivot location itself to change swingarm angle. To increase the anti-squat effect, you would: Raise rear ride height to increase swingarm angle; fit shorter gearing to change the chain/swingarm relationship; or raise the swingarm pivot to do both. Note that you must fit gearing with a different ratio to affect anti-squat—and not just bigger or smaller sprockets with the same ratio. It might sound counterintuitive, as the chain run does move significantly if you go from 15–45 to 16–48, for example. But even though the chain angle increases with that swap, the chain is farther away from the pivot, almost exactly offsetting the angle increase in terms of anti-squat.



An easy way to track front ride height is to measure how much fork tube protrudes from the top triple clamp. Race teams use the fancy “hockey stick” to accurately measure rear ride height, but you can also use a point on the subframe.



Anti-squat is a function of two forces acting on the rear axle. The first is driving force (red arrow), which pushes the motorcycle forward. If the swingarm is at an upward angle, this force extends the suspension. The second is the chain force (blue arrow), which pulls the axle forward and down in a direction parallel to the chain. In most cases, this also extends the suspension. The combination of these two forces acts to offset weight transfer from acceleration and prevent the rear suspension from compressing. The magnitude of anti-squat depends on swingarm angle, chain angle, and the chain's distance from the swingarm pivot.



As the rear suspension compresses, the swingarm angle and chain position can change considerably with a resulting change in anti-squat characteristics. On most bikes, anti-squat is just over 100 percent with the suspension fully extended, meaning the suspension will extend on acceleration as the anti-squat effect more than offsets any weight transfer. The typical chassis layout causes anti-squat to gradually decrease as the suspension moves through its travel. At full compression, some chassis will exhibit a pro-squat tendency (negative anti-squat) if the swingarm goes much past horizontal.

ALL ABOUT GEOMETRY

Center Of Gravity

Thus far, we have referred to raising or lowering the front or rear of the bike to change rake, trail, or anti-squat. But doing so raises or lowers the whole bike to a certain extent, and such a change on its own can also affect handling. To put numbers on these attributes, we often refer to the center of gravity (CG), which is the point where forces like load transfer, acceleration, braking, and cornering can be considered to act; it's easiest imagined as the point from which you could balance the entire motorcycle, as you would balance a hammer by supporting it near the head end rather than near its physical center. On most sportbikes, the CG with rider on is roughly midway between the front and rear wheel (hence the 50/50 weight bias of most bikes) and a few inches

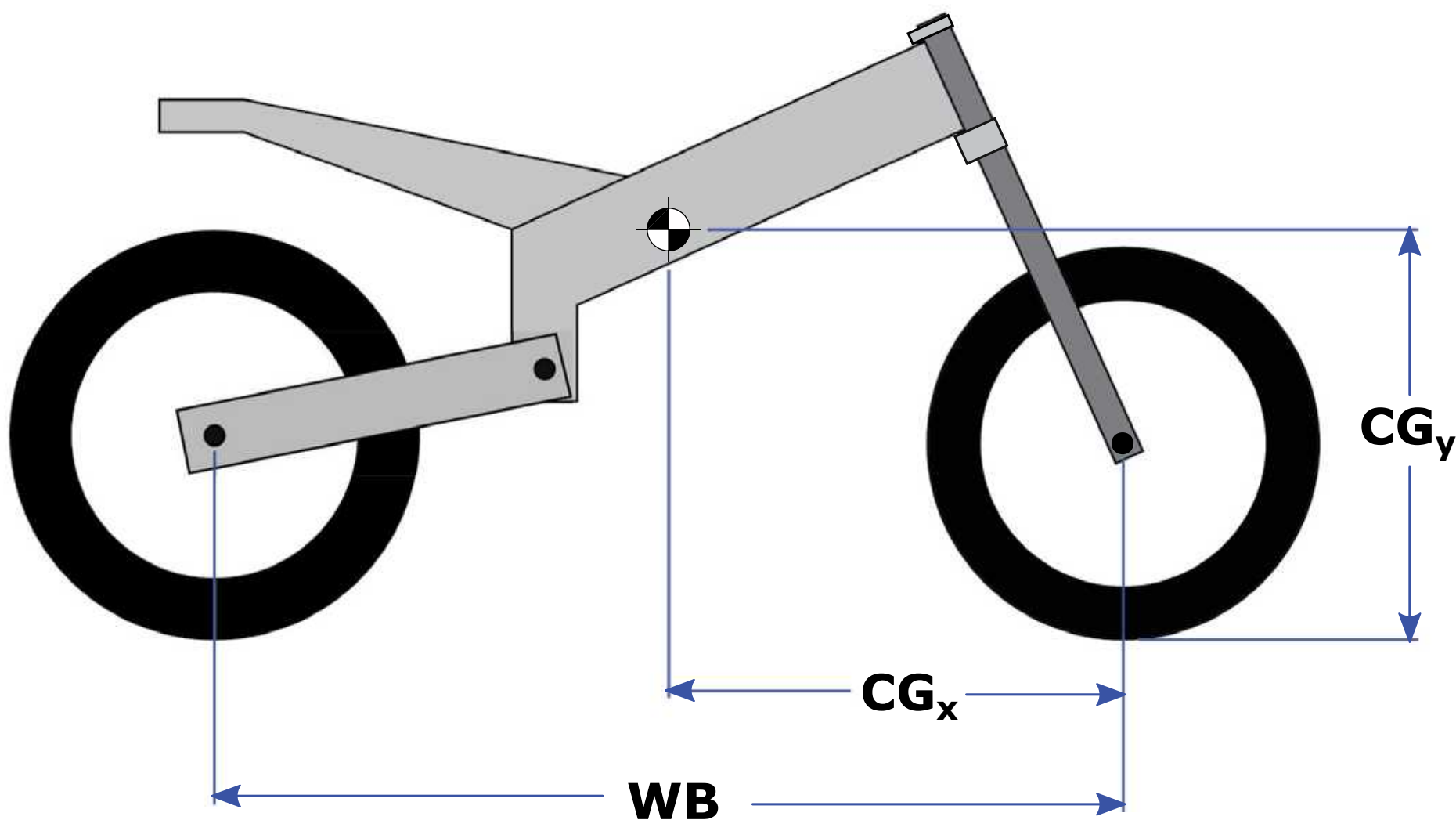
below seat height.

Here we are concerned with both the height of the CG as well as its position front to rear. If the bike is higher, wheelies under both acceleration and braking are easier as weight transfer is magnified; however, taller motorcycles tend to turn from side to side quicker for a given effort from the rider, and less lean angle is required for a given cornering force. A more-forward CG helps keep the front end down on acceleration and can help with front grip, but the rear end will more easily rise during braking and will not have much grip; the opposite applies if the CG is more to the rear of the bike.

There are no direct adjustments for CG, though on some bikes—like the Aprilia RSV4—the

engine can be raised or lowered. And there is also the rider's weight to be considered; moving the seating position can have a significant effect. As mentioned, a ride height change will raise or lower almost the whole bike, with a corresponding change to the CG. In the horizontal direction, adjusting the rear wheel in the swingarm does affect the CG to a certain extent.

Many people are under the impression that raising or lowering the front or rear of the motorcycle can add or take away weight from that end, but that is not the case—a ride-height change moves hardly any weight front to back, and the horizontal position of the CG changes very little. Not convinced? Do the math, or make the actual adjustments and record the weights using scales.



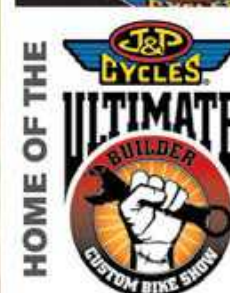
The center of gravity (marked by the crosshair symbol) is the point at which forces can be considered to act for many calculations. In most cases, the CG's physical location on the motorcycle cannot be changed, but there are some alternatives: Raising or lowering the entire bike on its suspension effectively raises or lowers the CG. In a similar manner, moving the rear wheel forward or rearward in the swingarm changes the horizontal CG position with respect to the wheelbase. And there is also the rider's weight, which can be repositioned for a change in CG.

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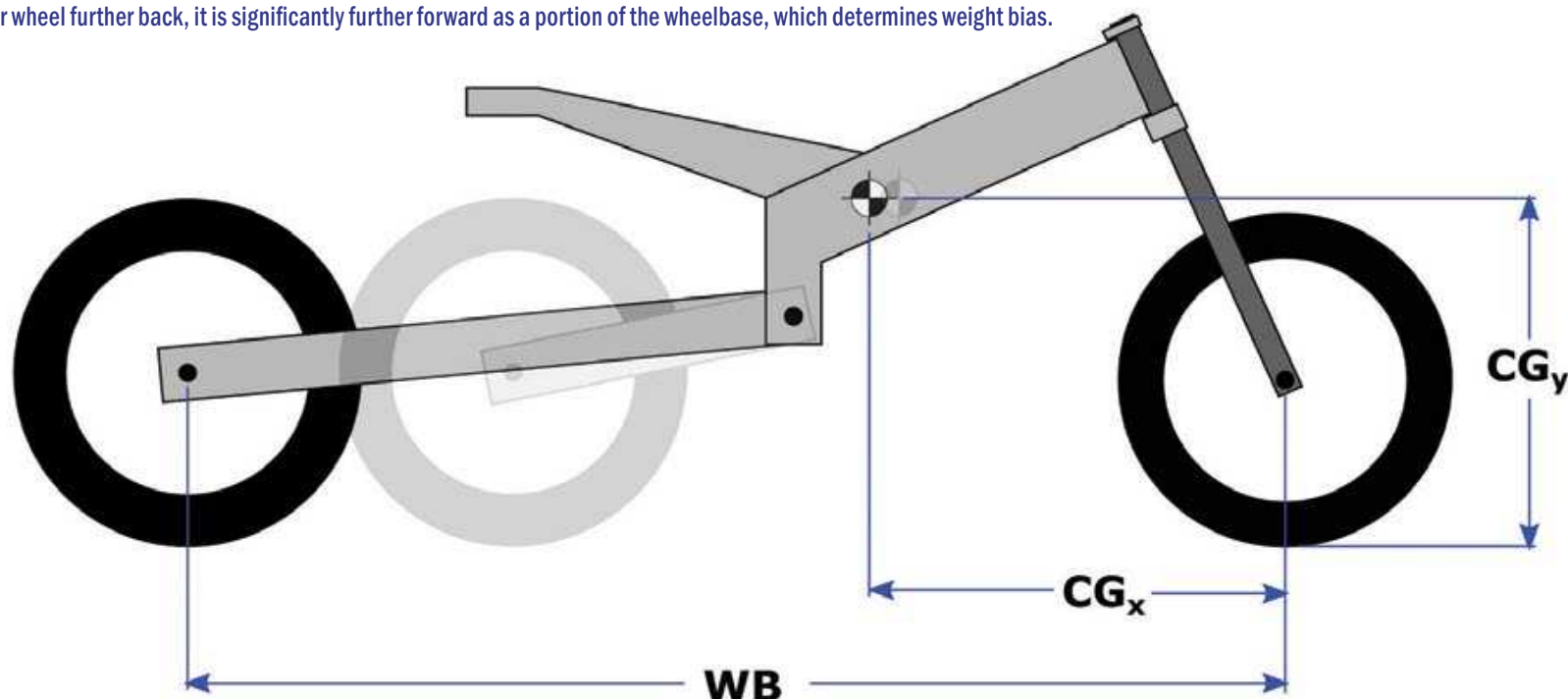
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ALL ABOUT GEOMETRY

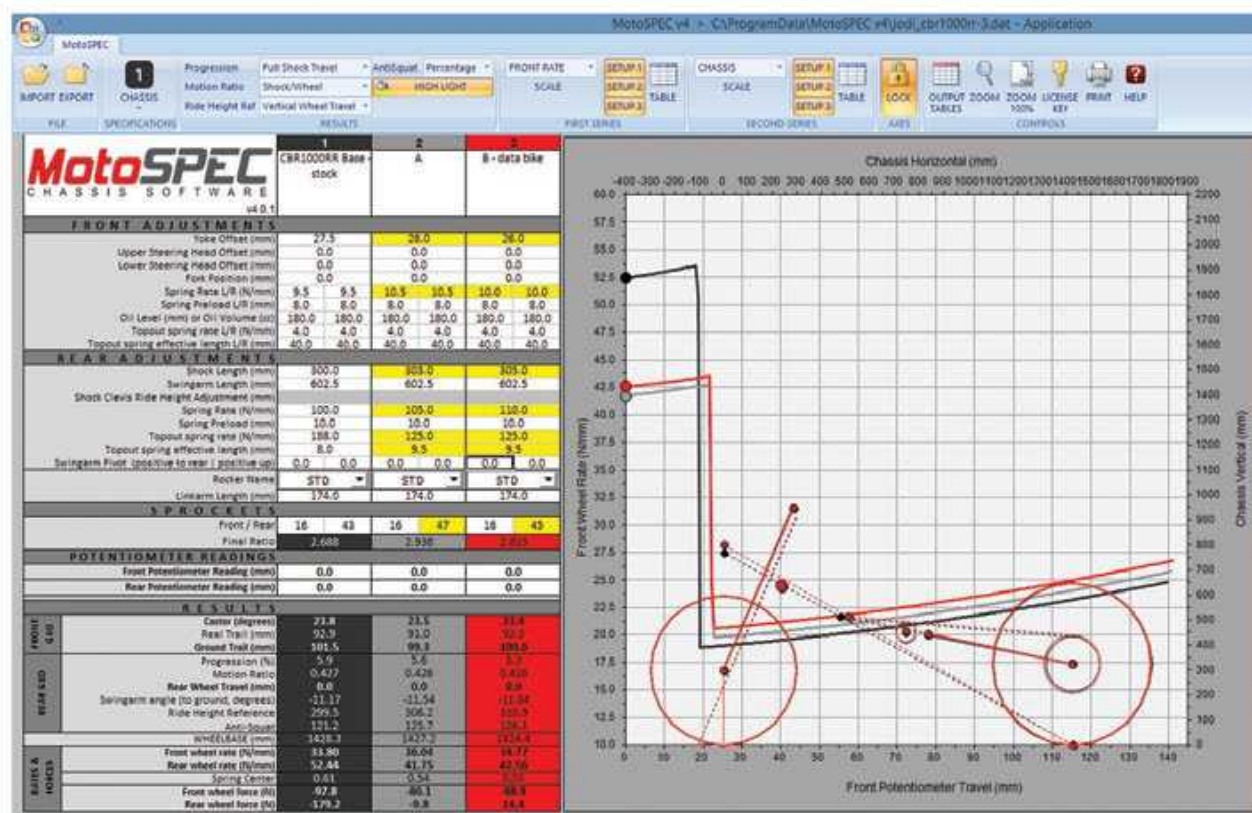
To use an extreme example, dragracers fit extended swingarms to effectively move the center of gravity position forward in the wheelbase and prevent wheelies on acceleration. Moving the rear axle in the chain adjustment blocks can have a similar (albeit much less pronounced) effect. Here, even though the CG has moved slightly rearward in the chassis due to moving the rear wheel further back, it is significantly further forward as a portion of the wheelbase, which determines weight bias.



Dynamic Geometry

The trouble that most people encounter with setup is that making a change to adjust one variable affects another of the many geometry numbers and so on down the line. This is especially true on streetbikes that have limited adjustments, which forces us to sometimes make changes in a roundabout way. So, for example, while Valentino Rossi's mechanics can change his M1's swingarm pivot height for more anti-squat, we have to raise the rear end for the same thing. But this also changes rake, trail, and center of gravity height. Often making a single change can introduce more problems than it fixes.

Adding to the confusion, everything that we have referred to so far is with the bike vertical and the suspension fully extended—a position that almost never occurs with the bike on track. Geometry numbers constantly change as the suspension compresses. Under braking, for example, the front suspension almost fully compresses and the rear suspension extends; just as if you were to change ride heights, this significantly reduces rake and trail and also lowers the CG. In terms of anti-squat, the swingarm and chain angles change



Race teams keep track of setup and geometry changes using some form of software that calculates important characteristics based on a number of input variables. These range from simple apps, which calculate change in rake and trail for given ride height adjustments, to more elaborate packages that track multiple setups and variables. This is a screenshot from MotoSpec (motospec.ca), a high-end program used by many world-level teams.

with suspension movement; anti-squat typically decreases with suspension travel and can even turn into pro-squat near the bottom of the stroke.

These dynamic aspects of geometry mean that spring rates and preload can affect how your bike works on track. Making just a single change to ride

height, spring rate, gearing, or any other adjustment on your bike can affect the entire setup and undo sometimes hours of work in terms of track and shop time. In our next issue we'll look at some common issues and ways to isolate and address them while minimizing those secondary effects. **SR**



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RED DAWN

Ducati's near-magical resurgence in MotoGP is the result of a team effort

BY LUCA SEMPRINI PHOTOGRAPHY BY GOLD & GOOSE AND COURTESY OF DUCATI CORSE



After winning its first—and, so far, only—MotoGP championship in 2007, Ducati suffered a slow but seemingly never-ending decline. The Italian factory soared to paradise with Casey Stoner only to be catapulted into an abyss along with his high-profile successor Valentino Rossi, then endured a winless, four-year purgatory amid a company overhaul that resulted, among many other things, in a change of ownership (the company is now part of the Volkswagen-Audi conglomerate), a new CEO, and (twice) a new general manager of the Racing Department. As an era came to an end, a fresh journey began under the steady guidance of Luigi “Gigi” Dall’Igna. The seraphic and poised 49-year-old engineer left Aprilia after more than 20 successful years to lead his once-rival company to a long-awaited revival. A challenge whose final outcomes have yet to be written, built on a simple proposition: teamwork.





All For One, One For All

"What a group can achieve always exceeds the skills of the single players," Dall'Igna says. "Ducati had a lot of technological and human resources already before my arrival. The organization perhaps was not the strongest aspect in its system. Now, however, I see a harmony, a unified approach, an agreement on which direction to take within the whole group."

Dall'Igna's scheme was simple, though not simplistic: to rebuild Ducati's Racing Department and turn it into a synergistic group. However, he did not start from scratch, looking for cornerstones among the ruins instead.

"A common mistake is to throw away all the work done by others and believe that only your own idea is the right one," he says, referring to his predecessors Filippo Preziosi and Bernhard Gobmeier. "You can learn so much from other people's experiences, if you have the necessary will and patience."

Within this process, the Italian engineer put a lot of emphasis on mutual trust and direction among all players involved. "The most difficult thing, as usual, was to build personal ties," he adds. "With Aprilia, I contributed to the choice of about 70 percent of the employees. With Ducati, on the other hand, people saw me as an enemy until the day before I arrived. It was crucial to establish strong relationships within the group."

That includes, of course, the riders. While both Andrea Dovizioso and Andrea Iannone were already part of Ducati's camp, uniting them within the factory team was part of Dall'Igna's strategy.

"I think both can do great things," he says. "I've been eager to work with Dovizioso for many years, and finally I can. Iannone improved a lot since last year and has an incredible potential, much of which has not yet been expressed. It's also important to have two riders with different styles because it exposes you to a wider range of requests and allows you to develop a more complete bike. Also, it creates a mutual stimulus to try to do better and learn from one another, which is fundamental in racing."

Needless to say, both Dovizioso and Iannone quickly bought into Dall'Igna's philosophy. "Before Gigi came, it almost felt like we needed a captain," Dovizioso says. "Ducati was going through some major changes, but it already had the necessary resources to be



The Ducati MotoGP team certainly has always had plenty of resources, but Dall'Igna's management now has the team and factory engineers working in a common direction. "What a group can achieve always exceeds the skills of the single players," Dall'Igna emphasizes.



Luigi "Gigi" Dall'Igna (lower right) listens in as Andrea Iannone describes to his crew chief Marco Rigamonti what the Ducati Desmosedici GP15 is doing. By listening to the rider's feedback, Dall'Igna can likely discern if any issues can be solved with setting changes or if they might be a more fundamental chassis/engine problem.

No one expected the new Ducati GP15 to be at the sharp end of the MotoGP field in its debut race, but the 2015 season opener at Qatar showed that Dall'Igna's measured development philosophy had paid off. Andrea Dovizioso (04) was only just beaten by Valentino Rossi for the win, with teammate Iannone (29) finishing a strong third.



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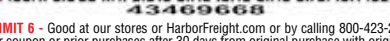
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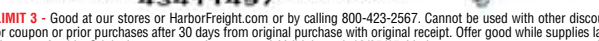
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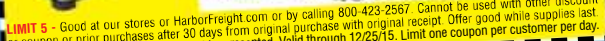
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competitive. It needed a guide, someone experienced. It's a normal tendency to pinpoint one or two people in a successful endeavor, but it's the group that makes a difference."

"Gigi brought a clear method with him," Iannone adds. "His mind is always on the target. He's sure of what he's doing, and his confidence trickles down to the people around him, both the engineers and riders. It's an important quality in a leader. Whenever I have doubts, it reassures me to talk with him. I strongly believe in his capacities, and those of his team, and I feel the trust is reciprocated."

Innovate, Don't Imitate

Dall'Igna officially stepped in as the new head of Ducati's Racing Department in November 2013 and was initially tasked with developing a project he did not design. Rather than throwing the existing project out and starting from a blank page, the Italian used the opportunity to study the strengths and weaknesses of the GP14 and, at the same time, lay the groundwork for the upcoming GP15. Encouraging results ensued. In 2014, the Desmosedici scored three podiums for the first time since 2010, constantly diminishing the gap from the front during races.

"It was basically a testing year for us, and we had to take some risks," Dall'Igna says of the 2014 season. "We took advantage of that experience to develop the GP15. We started from a new engine, which is smaller in dimensions and its positioning. But we didn't try to replicate the characteristics of Honda or Yamaha. When you copy, it's easy to do worse than the original."

The GP15 reportedly has about 1,000 components different from its older sister. Most important, it does not suffer from the same chronic turning problem.

"Since the very first lap in the Sepang [Malaysia] tests, even without pushing, I felt the sensations I was hoping for," Dovizioso comments. "The bike enters the corners and turns better. That was our main target, and we achieved it. I told Gigi: 'S—t, it works!' We headed into new territories and still need to fully explore the limits of the new bike, but we couldn't have had a better start."

The results of the first tests boosted Ducati's confidence, but arguably no one expected the team to challenge for a win at the season opener in Qatar, where the factory riders scored a surprising double podium despite having had basically just three days of tests on the new machine. Most important, the GP15 missed the victory by only a tenth of a second with Dovizioso.

"We just lack a bit of grip over the race distance compared with Yamaha, and we need to slightly improve stability under braking, but we're talking about minute details," Dovizioso says. "Now we can work more normally, we can play with setups to adapt the bike to our riding styles, while before it was inconsequential. The new bike is radically different from the old one. It's the offspring of a reorganization, not a revolution. We managed to keep most of Ducati's positive characteristics while gaining other advantages. We're still getting used to being so competitive again, to fight for victories and often step on the podium. I don't think anyone expected it, especially from the outside."

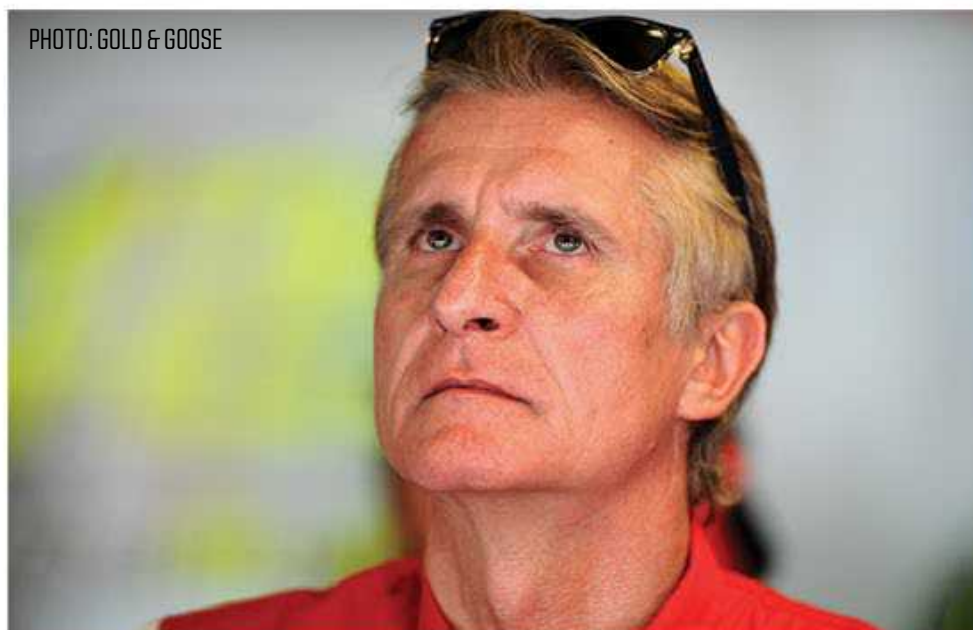
According to Iannone, continuing the development of the GP14 was also essential to shape a new, more competitive project.

"I want to reiterate the fact that the GP14, with its latest upgrades, was not an uncompetitive machine," he says. "Far from it, actually. It was a bike based on old philosophies, but it helped us to get where we are now. We improved it throughout last season, and the only issue we couldn't fix was how it handled in direction changes. It wasn't agile. From my very first out lap, I realized the GP15 had what the other lacked. That was crucial. Everything else, you can fix. After my first stint in Sepang, I told Gigi it was the right one."



Dovizioso scored three successive second-place finishes at the beginning of the season, showing that the GP15 had indeed solved much of the issues plaguing the previous-generation bikes.

PHOTO: GOLD & GOOSE



Ducati Corse's Sporting Director Paolo Ciabatti has heard the grumbling from other teams that the concessions for Ducati in MotoGP should now be abolished. "Everybody agreed to use a victory as the determining factor to take away all the advantages," Ciabatti recalls about the original meeting between the teams to give those concessions.



The Ducati GP15's speed definitely hasn't been lost on the competition. "I am quite certain that the Ducati that Dovi is riding is much better than [the one I rode]," Rossi says.



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Although most give credit to Luigi Dall'Igna for turning the Ducati MotoGP program around, Dall'Igna deflects that praise to everyone in Ducati Corse. "What a group can achieve always exceeds the skills of the single players," the former Aprilia Racing lead engineer says.

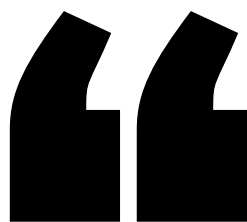
"I know Gigi talked about victory at the beginning of the season and it sounded a bit bold, but I think he overcommitted more last year," Dovizioso says with a smile. "He said he wanted podiums when we used to be about 30 seconds from the front on average. I don't think people expected us to be so competitive and consistent, but it should be normal to be in contention each weekend. We've completed the hardest part of the work, and now comes the most complicated task. We need to find the tenths, the hundredths, of a second that allow you to win. But we know it's possible, and, from a psychological perspective, it helps to 'smell it.'"

Red Alert

Ducati's surge has raised some eyebrows, especially within the Motorcycle Sports Manufacturers Association (MSMA). The concessions—basically extra fuel, tires, and engines—granted under the Open and Factory2 umbrella (which includes Ducati, Suzuki, and Aprilia) will be administered on a point-based system from the 2016 season onward. Honda and Yamaha, however, are pushing to make the norm retroactive and, consequently, deny Ducati any advantages.

In short, the new system will attribute three points for a victory, two for a second place, and one for a third. Once a manufacturer reaches six points, it loses all the privileges. If the rule were to apply to the current season, Ducati would have exceeded that figure almost right away and therefore race as a full-factory entry in 2016, with all the consequent restrictions.

"I think any criticism is futile," Dall'Igna



"A common mistake is to throw away all the work done by others and believe that only your own idea is the right one." —Gigi Dall'Igna



Think that the entire Ducati MotoGP squad wasn't elated by its double podium placing at Qatar? "I see a harmony, a unified approach, an agreement on which direction to take within the whole group," Dall'Igna says.

comments. "There's a rule book, and we're abiding by it. In fact, we had already complied with the Open regulations and then negotiated a compromise [the Factory2 category]. We have some advantages, of course, but we'll lose them as soon as we achieve the results that show a certain level of competitiveness."

"Our goal is actually to lose those advantages," adds Paolo Ciabatti, Ducati's sporting director. "We always said we wanted at least a win this year, and we're already working on the prospect of using only seven (sealed) engines next year (compared with nine, sealed separately throughout the season, available within the concessions). Everybody agreed to use a victory as the determining factor to take away all the advantages. We're ready for that possibility, but the rules were unanimously approved and therefore have to be accepted."

While the political tug-of-war can only be solved by the Grand Prix Commission—where Dorna, which organizes and promotes the series, has the upper hand—early rumors hint at the possibility to add another clause, which would deny all the advantages in case a contracted rider

finishes the championship in third place or higher. Considering Honda's struggles, Ducati could indeed achieve such a result. As an example, after the ninth round of the season, Iannone and Dovizioso were third and fifth, respectively, in the rankings.

In any case, since Dall'Igna arrived, Ducati has changed the status quo both on and off the track. The bearded general with a mischievous gaze has reformed the ranks of a bunch that, even though it stayed wild, is cohesive once again. To single him out in this process, however, would go against his very philosophy.

"During the team's presentation, when I said we wanted to win at least one race this year, many people probably started to laugh," he recalls. "But it turned out to be a realistic goal. In the end, winning is the only thing that counts. It doesn't matter how much it depends on the bike, the rider, or the team. Success always stems from the group."

Within this paradigm, Ducati has already won its most important battle. A fundamental, though not sufficient, condition to put everyone else behind on track. **SR**



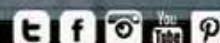
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WORLD GP BIKE LEGENDS —THIS IS NO PARADE

New racing series looks to bring back the legends of two-stroke Grand Prix racing on the motorcycles that made them famous

BY ALAN CATHCART PHOTOGRAPHY BY GOOSE LIVE EVENTS







Usually historic GP bike racing means Manx Norton and Matchless G50 four-stroke singles of the '50s and early '60s participating in events like the Goodwood Festival or various enthusiast series around the world that have embraced competing with the bikes of yesteryear.

But a midsummer weekend in June saw much more recent racing history live again at Spain's Jerez GP track, with the fire-breathing 500cc V-4 two-strokes of the '80s and '90s GP era going handlebar to handlebar once again. Even better, those V-4s were ridden by the legendary stars who had raced them back then, competing against each other in a trio of races that were very definitely not parades. Former 500cc Grand Prix champions Wayne Gardner (1987), Freddie Spencer (1983, 1985), and Kevin Schwantz (1993) each climbed to the top step of the podium in the three 500cc races headlining the inaugural World GP Bike Legends event, which also saw the likes of former factory stars Christian Sarron, Phil Read, Graeme Crosby, Tady Okada, Didier de Radiguès, Steve Parrish, and GP privateers Gary Lingham, José Cardoso, and Niggi Schmassmann. All were racing genuine 500cc GP racebikes furnished by trusting collectors, risking their priceless bikes being put to the use that they were designed for.

The World GP Legends event was the largest collection of former racing heroes yet assembled on the starting grid for a race, with more than 300 Grand Prix wins and 13 World Championship titles—and that was just in the 500GP class. There were also support races for 250/350cc and 125cc two-strokes, the latter won by four-time World Champion Jorge "Aspar" Martinez, taking time off from his day job as MotoGP team owner to race a 1991 Aprilia RS125 to a pair of victories ahead of his former teammate and final 80cc World champion, Manuel "Champi" Herreros, on a Honda RS125. Former Spanish 250GP/Superbike champion and factory Honda/JJ-Cobas 250GP rider Carlos Cardús won both 250/350cc events on a Honda RS250, with two-time World Champion Carlos Lavado making the trip from Venezuela to race a Yamaha TZ250 on which he finished fourth.

The Jerez event was the first of what is intended to be an annual five-race Legends series incorporating rounds in the UK, Italy, the USA, Australia, as well as in Spain, staged by British-based Goose Live Events, whose CEO Nick Wigley has a track record of successfully nurturing events such as this. The Silverstone Classic he runs in July each year is the world's largest competition motorsports event in terms of race entries, with the record total of 1,125 cars on track at last year's event expected to be surpassed at the 2015 running. "I'm so proud of the whole team for bringing World GP Bike Legends to life," Wigley said. "I need to thank a lot of people for making it possible but especially Wayne Gardner for being such an incredible ambassador in getting so many legends together to race this weekend. The passion from the fans here at Jerez is like nothing I've ever seen, and the potential for this to be major on a global scale is really exciting. We're already in discussions to take the event to more venues around the world."

Indeed, it's the Australian former 500cc GP world champion who deserves the kudos for helping create this event. "Nick Wigley and I met up at Goodwood a couple of years ago and started talking about organizing a bike race at one of his meetings," Gardner recalled. "Originally he was thinking of having a Manx Norton race like everyone else, but I managed to convince him that if you're going to stage a Classic meeting, it had to be bigger and better than all the rest, and so it would be better to focus on the two-strokes and the guys who raced them back then. There is no two-stroke race category anymore anywhere in the world, and yet these are the last pre-electronic-era racebikes, so they can be raced without heaps of factory support and electronics engineers. People love to hear the two-strokes, so I recommended he should focus on bringing them back, and so that's what the GP Legends will basically be about. Originally I was hoping for around 25 500GP bikes, but we've ended up with 18 bikes here in the pits at Jerez, which is enough



It's almost like a snapshot of a race from back in the '80s and '90s, with Schwantz, Spencer, and de Radiguès standing on the podium. Of course, the big giveaway that it's modern times are all the spectators taking snapshots with their smartphones...



No event with racing legends would be complete without the autograph sessions. Here former Honda factory rider Tadayuki "Tady" Okada signs autographs for the Spanish crowd.



Kevin Schwantz (left) chats with Freddie Spencer (center) after the World GP Legends race on Sunday, while Didier de Radiguès (right) enjoys the adulation of the Spanish crowd.

to get started with. But as I was looking for them, I realized there were heaps of 125s and 250s/350s around that could still be raced, so I went to Nick with the idea of adding these to the program. That's when we decided to run a complete GP Legends meeting. We hope this will be the first of several such events, and I've got all the guys on board to make this a series we can take all over the world."

The first of the three headliner races saw Gardner grabbing the win on Saturday aboard Chris Wilson's 1989 ex-Randy Mamola Cagiva V589, ahead of de Radiguès on a Suzuki XR89 RGV500 and Schwantz on the very same Suzuki XR84 RGV500 that he defended his World title on in 1994—both bikes the property of renowned Suzuki collector Steve Wheatman. Pole-sitter Sarron dined with Spencer for fourth place, both mounted on factory YZR500 Yamahas. After it proved impossible to source a trackworthy Honda two-stroke of any vintage for Spencer or Gardner to race (*Editor's note: HRC's longtime policy has been to never sell works bikes, with all but the lucky few that end up in the Honda Museum at Motegi eventually headed to the crusher*), Sarron's team manager Hubert Rigal, Monaco's only GP racer back in the 1970s and today Europe's largest dealer in Historic GP racers, stood aside to allow Spencer to race the 1988 ex-Sarron bike that Rigal was originally slated to race, while Sarron raced his 1989 model. "It's more important that Freddie races than me," Rigal nobly stated. "Anyway, he might have a better chance of beating Kevin."

Indeed so, for in the first of Sunday's two races it was Fast Freddie's turn to take the flag ahead of Schwantz and de Radiguès. In the final race, Schwantz grabbed the win after battling with Spencer to the delight of the sizable crowd of Spanish race fans. "For us it's brilliant to be back on the 500s again, no matter what the brand of bike," Spencer said. "I've been riding a motorcycle I was actually racing against back in the '80s! It's a great connection between us guys up here, the collectors who have given us the opportunity to race these bikes again, and the fans who have come along to see us—the look on people's faces here at Jerez is what it's all about. I'm truly looking forward to where this is going in the future and being a part of it."

Building on what was certainly a successful debut at Jerez will present significant challenges, however. The key issue is the ongoing availability of



Wayne Gardner (between Spencer and Schwantz) was the driving force behind getting the World GP Legends series concept to happen. The Australian (1987 500cc GP world champion) and promoter Nick Wigley hope to take the series global in five countries very soon.

suitable bikes, with few of those remaining in existence belonging to owners with the magnanimity and resources of Wilson and Wheatman in allowing them to be raced once again in something approaching anger—with inevitable consequences. "It's great to be back riding the old motorcycles and to remember how they were in the old days," Parrish said. "Unfortunately, I'd like to apologize to Steve Wheatman because I managed to break one of his bikes today, but he had another one I was able to go out on instead. It's been very kind of him to lend them to me."

The current concentration by the factories on four-strokes and their increasing complexity mean there's little hope of any manufacturer support for the Legends series. This would presumably mean following the same path as modern-day single-cylinder Classic racing, where few of the plentiful Manx Nortons in action at Goodwood or elsewhere are original-period motorcycles but instead are the products of the thriving support industry that produces more-or-less authentic replicas and the spare parts to keep them running. Hubert Rigal is already working on producing new Yamaha YZR500 engines, and at the stage that these are available, it'll be a short step to making complete bikes. But that's just one manufacturer, and promoter Wigley says he doesn't want replicas taking part in his Legends events, though shrinking



Kevin Schwantz was aboard the exact same Suzuki RGV500 he rode to defend his World 500cc Grand Prix title in 1994. Owner and collector Steve Wheatman graciously allowed Schwantz to race the bike, but it's clear an alternative to riding these priceless machines needs to be found because of the lack of spare parts.

grids as precious spares are used up might cause a change of mind.

"I'm not that keen on having my bikes raced as opposed to paraded, even in a relatively, shall we say, gentlemanly way, as has been the case this weekend," said British collector Wilson, who had three bikes on the grid. "But I felt it was right to support Nick Wigley in getting this Legends concept off the ground, although I don't think I'll let them be raced again. If somebody makes replicas, that's another issue—I might buy a couple and enter the guys on those. But we can't go on running these original bikes so intensely because we'll end up killing them stone dead—we won't have parts to run them at all anymore. I don't mind bringing them here for a five-lap demo or even two each day but not to race."

"We need to try and figure out how to do it without jeopardizing the equipment that people have so much money invested in," Schwantz agreed. "When I say jeopardizing, what I mean is its life expectancy. These things have such a short usable mileage before you have to tear them apart for servicing, so one weekend like this can be really expensive—before any thought of crashing them. But I think anytime a 500cc two-stroke starts up it's going to draw a crowd, so I really hope there's some way of putting all this together, maybe with some equipment that isn't quite so valuable."

Wilson came up with a unique idea. "Let's get a series of bikes with 600 or 675 Supersport engines and paint them up in the colors of the GP bikes these great riders raced with: Kevin's number 34 Suzuki, Wayne and Freddie's Rothmans Hondas, Christian's blue Sonauto Yamaha, and so on. Then let's go racing; they'll be modern bikes but in retro colors, so you'll have the Legends in action again racing against each other on bikes that can easily be repaired if needed. Then alongside that we have short demo rides of them aboard the 500GP two-strokes they used to race. There are two kinds of legends here, bikes and people—and that way you get them both in action."

"That's probably one of the best ideas that I've heard and maybe the most practical too," Schwantz concurred. "Paint them up to make them look



The action wasn't just limited to the 500cc two-strokes. Here, current MotoGP team owner and former 125cc GP champion Jorge "Aspar" Martinez leads the 125cc World GP Legends race, which he eventually won.

like the historic racebikes, but let them be modern equipment. So if one gets broken or crashed, it's not a half-million-dollar investment gone to pot, but you'll still have the two-strokes to parade around and let people get a taste of their sight and sound, which is pretty unique.

"You know, I've been to some events where they just start up the MVs without even running them on track, and that's enough to excite the crowd each day," Schwantz added. "It's not gonna be that sound of a bunch of 500 two-strokes coming past the start line, but we can give them that in the same program if we do the parades."

Here's hoping that the World GP Bike Legends series idea continues to gain momentum because it would be a shame for the legacy of the Golden Era of Grand Prix racing not to have a showcase such as this. **SR**



The World GP Legends racers pose with some of the priceless two-stroke Grand Prix machinery they were allowed to race by gracious owners. There's more than 20 World Grand Prix championships and countless GP victories within that group.

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HANG-DRY SUIT HANGER

Nothing ruins an afternoon riding session like having to wiggle your way back into the sweat-drenched riding suit you shed just before lunch. Fortunately, the guys from Hang-Dry have come up with a solution for those warm days at the track, this in the form of a hanger with built-in fan that forces air through the suit and dries it while not in use. Simply plug the hanger in via the 12-foot power cord and let the fan, with steel impeller and motor output of 250 cfm, do the work. Retail is \$185, and multiple colors are available, plus graphics. hang-dry.com

QUICKSHIFTER EASY

The Quickshifter Easy is a strain-gauge quickshifter for sportbikes that connects to your smartphone via Bluetooth to enable in-app setting adjustments for sensor sensitivity and cut-off time at specific rpm. A plug-'n'-play harness makes for an easy install, while no rods, switches, or moving parts are claimed to provide increased reliability. Retail is \$319.99. bluemonkeymotorsports.com, (208) 255-7969

SHUTTER SPEED 2

Fearless Isle of Man road racers captured on camera

Dave Collister
and Mick Duckworth

BITCHIN' FRESH KIT

BY BRADLEY ADAMS PHOTOS BY JOE MCKIMMY

WEEGO JUMP STARTER BATTERY+

The only thing worse than being stranded with a dead battery is having a dead phone at the same time, as that makes calling for help a little more of a challenge. With the Weego Jump Starter Battery+ you're safe either way, since this portable charger with 12-volt lithium-ion jump starter can bring your engine to life plus charge your phone, tablet, or other USB device. The Weego Jump Starter Battery+ costs \$99 and comes with jumper cables, wall and car chargers (1.5-hour charge time), and three-in-one USB charging cord. myweego.com

SHUTTERSPEED 2 BOOK

Shutterspeed 2 is what coffee tables were made for, at least if you're not a coffee drinker—and probably even if you are, as the book features some of Dave Collister's best photos from recent Isle of Man TT events. Each photo is accompanied by text that tells the story behind the rider, section of the course, or race, often with quotes from the rider that are just as much a conversation starter as the photos themselves. Retail for the book is \$29 (£18.50). lilypublications.co.uk, amazon.com

WOODCRAFT AXLE SLIDERS

The unique design behind Woodcraft's Axle Sliders enables them to be attached via a quick-release pin that keeps tire changes from being any more time consuming than before. Meanwhile, the \$59.99 sliders protect your bike's fork lowers and swingarm in the event of a crash and are designed to provide a solid sliding surface, maximizing puck life. woodcraft-cfm.com, (978) 297-2977



Life is full of simple pleasures, and, as it turns out, so too is the aftermarket world. Here are seven new, unique, or otherwise handy parts for you or your bike that, albeit simple, will definitely bring pleasure to the rest of your riding season. Check 'em out!

TIROX SNAPJACK

TiRox says that 30 percent of riders with a chain-drive bike and sidestand *do not* own a stand for chain maintenance. For those riders (and those without a friend willing to lend a hand), the company has created the SnapJack, a portable jack that lifts the rear tire a half inch off the ground for cleaning for lubing the bike's chain, either in your garage or in the middle of a longer ride. SnapJack sells for \$49.95. thesnapjack.com

GYROCAM MOUNT FOR GOPRO

The GyroCam Mount for GoPro cameras enables you to look at on-board videos from a new angle—literally. The mount uses an Inertial Measurement Unit (IMU) with magnetometer to determine the camera's relation to earth and then a brushless motor to adjust for level horizon, ultimately providing the same style of on-board footage you see during MotoGP races. The GyroCam Mount weighs less than half a pound, has a 70-minute-plus battery life, and accommodates GoPro Hero 3, 3 Plus, and 4 cameras. Mounts start at \$225. motogyrovision.com



PUSH YOURSELF AND YOUR MARKERS

Improving as a rider by stepping out of your comfort zone

BY BRADLEY ADAMS PHOTOGRAPHY COURTESY OF ADAM CAMPBELL

» Complacency won't get you anywhere. This is true in life and in motorcycle riding. Push yourself in a calculated manner, however, and you'll start making progress in leaps and bounds. In motorcycle riding, that means moving reference markers, with the end result being a gradual improvement in lap times. But what reference markers should you be moving and, in pushing, how far is too far?

To briefly recap, reference markers are marks or objects on or near the racetrack that you will use to know exactly when to perform actions such as applying the brakes, letting go of the brakes, turning the motorcycle, or opening the throttle. Hitting these same markers lap after lap allows for consistent lap times and keeps you from getting "lost" on the track, with more markers generally equating to more consistency. But hitting the same reference markers over the course of multiple trackdays will also only allow you to go the same pace, lap after lap, trackday after trackday. There is no progress in terms of pace, even as your comfort level and riding ability comes up.

So which markers do you move and by how much?

While the answer to the "how much" end of that question is dependent on rider skill, comfort

level, and bike setup, the answer to "which markers to move" is a bit easier to formulate; our general recommendation is braking markers (where you apply the brake) and throttle-application markers (where within the corner you open the throttle back up). Note of course that these markers will, regardless of skill level or comfort level, need to be adjusted in small margins, and moving one can have a direct impact on your ability to hit the other. Move your brake marker too far forward, for example, and you could be carrying so much speed into the corner that you're unable to get back to the throttle as you roll past your throttle-application marker, which in turn affects your drive off the corner and your speed down the successive straight (read: It could actually worsen your lap time).

This is where the riding skills that you've been working on come into play. As you begin to feel more and more confident with braking, you can move your marker farther forward and start grabbing the brakes harder as you get into the corner. The end goal is to arrive at the apex of the corner at or near the same speed as before but to set that speed in a shorter distance.

Once you're able to consistently hit your new brake marker and feel comfortable with your corner-entry speed, you can begin experimenting

Pushing your brake marker 10 feet up the track, closing your eyes, and hoping for the best might get you around a track faster for one lap, but it's not the safe way to improve your lap times. Instead, slowly shorten up your braking zone, moving your brake markers just a few feet at a time.

with a new throttle-application marker. Opening the throttle sooner has mass benefits detailed in *Sport Rider* over the years, not the least of which includes taking load off of the suspension and settling the chassis. Opening the throttle earlier will also enable you to carry more speed through and out of the corner, with the obvious risk being carrying too much speed and running wide in the middle or exit of the turn. Try moving your reference marker 2 feet back and then another foot if you're still able to finish the corner off with ease, taking note of traction (at the front and rear) as well as your ability to hit your apex and corner-exit markers. The goal here is to continually find your limits as a rider and the limits of your bike and to ride on the side of them that enables you to feel comfortable and safe, while still working to leapfrog physical or mental barriers and gradually increase your pace.

And that's the joy of motorcycling riding: There is always room for progress, both in terms of riding and setup—so much so that it's asinine to ever become complacent. **SR**

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DAINESE.COM



Trying to find a versatile warm-weather jacket and pants combo that can handle the occasional rain shower while warding off the cooler nights is tougher than it sounds. Sure, there are mesh jackets and pants with internal liners, but it's a hassle to carry the liners around when not in use, and even when you are using them (especially the waterproof liners), you end up with your own portable sauna after a while because—despite claims to the contrary—they don't breathe very well.

Enter Dainese's Rainsun jacket and pants. Although primarily intended as warm-weather apparel, the Rainsun jacket and pants are adaptable enough to work in the spring and fall seasons as well. The textile combo utilizes top-notch materials along with excellent venting to achieve this difficult goal.

Both the Rainsun jacket and pants have outer

shells constructed primarily from Dainese's water-resistant Motegi fabric that has a moderate amount of abrasion resistance along with a small bit of stretch for good fit (both the Rainsun garments are "slim" tailored for a stylish look). Dainese's D-Dry waterproof membrane is laminated to the inner side of the Motegi fabric to give it even more water resistance, with mesh liner sewn above the membrane for comfort.

The Rainsun jacket is actually two jackets in one. Inside of the outer shell is a tight-woven mesh jacket liner that contains removable composite armor (EN 1621.1 standard-certified) for the shoulders and elbows (along with a pocket for optional back protector). The liner attaches to the outer shell via snap loops, with the outer shell featuring full-length zippered vents on the inner arms, sides, and flaps that expose the shoulders. The arms have snap adjusters to keep a snug fit,

with the waist using a drawstring and the collar/wrists utilizing Velcro flaps for adjustment. Both the outer jacket and liner have a zippered pocket on each side, with an inner pocket as well.

The Rainsun pants don't have the same two-piece construction as the jacket, with woven mesh liner instead sewn in to the frontal portion of the pant legs and composite armor in the knee/shin area. Full-length double zippers on both sides of each leg allow the pants to expose the mesh liner for the length of each leg if desired. Waist adjustment is via Velcro-fastened flaps, with a zippered pocket on each side.

In hot weather, the idea is to remove the Rainsun outer shell and just use the mesh inner jacket, but to tell you the truth, we never really saw the need. Opening up all the vents on the outer shell created enough airflow to keep us from overheating on a 98-degree Fahrenheit day while at the same time affording a bit more abrasion protection. It's the same with the pants; the dual double zippers allow you to peel back part of the outer shell as far as you want for airflow. With the outer fabric being an excellent wind blocker, zipping all the venting up allows the Rainsun jacket/pants to keep you comfy down to around 60 degrees Fahrenheit, making them functional multi-season apparel.

As far as water resistance, the treated Motegi fabric with D-Dry membrane does a good job of keeping moderate moisture out. Sudden showers can be repelled without much problem, but the Rainsun is not claimed to be waterproof, so anything more than 15 minutes of rain and leakage will occur at the numerous zippers.

Our only real gripes with the Rainsun apparel are with the inner mesh jacket. The shoulder armor isn't contained within a pocket, so when you put on the jacket, your shoulder can sometimes catch the armor and get it tangled up. Also, when you stick your arms through the sleeves, if you're not careful, you can end up going through a hole for the elbow armor.

Other than those complaints, we've grown to like the Rainsun jacket/pants combo, though as with most high-quality apparel, the two are not inexpensive.

WHAT
WE'RE
TESTING

Cortech Super 2.0 Contoured Saddlebags

Finally, a company has made saddlebags to work with the curved tailsections of modern sportbikes. Cortech's new saddlebags fit like they were made for each bike and have loads of storage space. We'll have a full report on the Super 2.0 Contoured bags in an upcoming issue.



JRI Street Fighter Shock

JRI says the wallet-friendly Street Fighter Shock (\$699 with integrated reservoir) is no slouch around a racetrack, a claim we're looking forward to testing in the upcoming months. Stay tuned for a review.





PIT BULL PIT CREW TIRE WEDGE

Back when I was racing and tire swaps were done more periodically, my dad began traveling to the track with a block of wood. Whenever someone asked what he was doing with said block of wood, he'd very proudly throw it under the wheel of our racebike and show them how much easier it made getting the rear wheel in place and the axle through the swingarm. Smart guy, my dad.

But now there's no need for that block of wood, with Pit Bull recently coming to market with its Pit Crew Tire Wedge, a slightly more elegant solution to the frustration caused by rear-tire changes. The Tire Wedge is still simple in design, with the unit clamping onto Pit Bull rear stands sans hardware and being easily adjusted for height between 0.75 to 4.9 inches via a spin knob that works on a threaded stud. As with my dad's block of wood, this helps align the axle spacers and brake caliper mounts without having to hold your foot under the rear wheel and wrestling the hardware in place.

We recently ordered a Tire Wedge and started using it for rear wheel swaps in the *Sport Rider* garage. The result was a few minutes saved for wheel installs and a lot fewer curse words being thrown around, with the tire rolling easily into place and spacers not bouncing every which way. The Tire Wedge clips onto the rear stand with ease, and height adjustments are made with just a few turns to the adjustment knob.

Access to the knob can feel limited by the size of your hand, but fortunately you're not having to make more than a few turns at a time. Depending on the caliper mount style, you might also have to adjust the height of the Tire Wedge just slightly during wheel installs.

At \$89.95, there's no doubt the Tire Wedge costs a bit more than my dad's block of wood. With height adjustment and easy pairing to Pit Bull stands, it's a better option though. If you have the hands of a surgeon (or just more patience than us) and do wheel swaps very rarely, then it might not seem like a great investment. On the other hand, if you struggle with wheel swaps and do them often, we'd recommend the Pit Crew Tire Wedge. **SR**



DETAILS
PIT BULL PIT CREW TIRE WEDGE
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Wait, there's still plenty of tread left on the sides...

Tire Wear And Replacement

I have been riding at a couple of trackdays this summer, and I had a question about tire wear. If I keep doing trackdays, should I be able to run my tires right down to the wear bars before replacing them? I have been using Michelin Pilot SuperSport tires, and I ride in the intermediate group. Various people have said that I will only be able to do two or three days on a set, while others have said I will have to change them when they are halfway to the wear bars. How many days should I expect to get out of a set?

Bill Churchill

London, ON

There are many factors that determine tire wear on the racetrack, making any hard-and-fast rule for replacement intervals almost impossible. Your riding level, the weather conditions, the track surface, and the tire itself all factor in to how long a tire will last at the track. A novice rider on street tires might go a dozen trackdays and be able to wear tires right down to the wear bars without noticing any change in performance, whereas some top-level racers will not use a tire with more than one tire-warmer heat cycle on it—even if it hasn't actually been used.

In general, tires nearer the street end of the

spectrum are less affected by heat cycles, and it's more about the actual wear of the tire. Used on tracks that are not overly abrasive and in moderate temperatures, and at a pace that doesn't over-heat the tires, a street-based tire will go multiple trackdays with little or no degradation in performance. When I instructed at Jason Pridmore's Star Motorcycle School, we would routinely go several hundred track miles before changing the instructor bikes' Dunlop Sportmax Qualifiers with no issues.

DOT-race tires are definitely stickier and give better performance but will perform at their best for just a single session or race at the track; grip

degrades significantly with each heat cycle, and actual wear can be noticeable in less than a dozen laps at a trackday under moderate-to-hard use. This is partly why we have never recommended DOT-race tires for trackday use: Sure, they work great for the first session, but then it's all downhill from there, especially at a hot, abrasive track.

Street/track tires like the Michelin Pilot SuperSport tires you are currently using (Michelin says the SuperSports are intended for 50 percent street and 50 percent track use) are constructed to straddle the middle ground here. They are typically able to withstand multiple heat cycles and trade off some of a street tire's durability for improved grip at the track. While you will definitely get more than a single session out of a street/track tire, how much more begins to depend on those other factors: On a hot day in Southern California at a grippy track, an expert-level rider could see significant wear over a single trackday, notice a definite decrease in handling performance, and choose to mount a new set for every trackday. Riders at the intermediate or novice level, riding in conditions that don't tax the tires, could go as many as several trackdays without noticing any drop in performance from a street/track tire.

A couple of other considerations about tire replacement intervals: If you are riding on worn tires or even worried that your tires are past their prime, it will take away from what you are trying to do at a trackday—work on your riding. Fresh tires will give you confidence to push yourself to your own limits rather than the tires' limits and focus completely on your riding. And as we've stressed before, it also comes down to your budget and what the peace of mind from new tires means to you. Is it worth risking a fall just to eke out another trackday from a set of tires to save a few bucks?

*All that is a long-winded way to get to this: When to change your SuperSports is really a matter of their performance over time and your confidence in them rather than the actual wear, provided they have sufficient tread and the rubber itself is not visibly deteriorated or shows abnormal wear. Given your intermediate level of riding, I would suspect that you will experience that drop in performance and your confidence in the tires or see that visible deterioration well before you get down to the wear bars, and that will be the sign to replace your tires. **SR***



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PARTING SHOT



PHILIP & NELSON

As if the leg-dangling fad/style was not weird enough... Taylor Knapp, a top Superstock 1000 rider in the MotoAmerica series, evidently takes his outside foot off the peg in many corners. Here Knapp almost ends up tangling with Superbike racer Chris Fillmore, who is using a more “traditional” inside-leg dangle, at Barber Motorsports Park. It’s beginning to look like kickboxing out there.

An advertisement for Shinko Motorcycle Tires. The background is a scenic landscape with a winding asphalt road through a valley, flanked by green and brown hills under a blue sky with scattered clouds. In the foreground, two large, black motorcycle tires are prominently displayed, angled towards each other. The tires have a distinctive tread pattern with several deep, curved grooves. At the top, the 'Shinko' logo is written in a large, white, stylized script, with 'Motorcycle TIRES' in a smaller, red, blocky font below it. At the bottom, the text '010 APEX' is written in large, bold, blue letters with a white outline, followed by 'PERFORMANCE/SPORT RADIAL' in a similar style. Below this, a paragraph of text describes the tire's features. In the bottom left corner, there is a small logo for 'DISTRIBUTED BY WPS'. In the bottom right corner, the website 'shinkotireusa.com' is listed.

Shinko

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